NEW HAVEN RAIL YARD FACILITIES IMPROVEMENTS

NEW HAVEN RAIL YARD
New Haven, CT

MAINTENANCE OF WAY BUILDING

SPECIFICATIONS

(VOLUME 1 OF 3)

April 2015

STATE PROJECT NO. 0301-0124

Prepared For:

Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, Connecticut 06131-7546

Submitted by:

Parsons Brinckerhoff
500 Winding Brook Drive
Glastonbury, Connecticut 06033

SECTION 00 01 01 - PROJECT TITLE PAGE

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* Not authored by Parsons Brinckerhoff
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PART 1 GENERAL

1.1 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of the Contract Documents, as follows:

B. Site and Utility Survey: Available upon request from Parsons Brinkerhoff.

C. Geotechnical Report: Entitled Maintenance of Way Building and Employee Parking Final Structure Soil and Rock Report, dated December 2014.

1. Original copy is available for inspection at Owner's offices during normal business hours.

2. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Designer.

3. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in the Contract Documents.

4. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.

D. Hazardous Material Survey: To be performed upon existing building demolition completion.

1. Original copy will be available for inspection at Owner's offices during normal business hours.

E. Task 210 Reports – Subsurface Site Investigations.

1. See Section 01 11 00 for additional information available on reports.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PERMITS

A. The following permits will be obtained by the Owner, at no cost to the Construction Manager at Risk (CMR):

1. Flood Management Certification

2. General Permit Registration for Discharge of Construction Dewatering Wastewaters

3. Major Traffic Generator Certificate

B. The following permits are known to be required and shall be obtained and paid for by the Construction Manager at Risk (CMR):

1. Building Permit

2. Excavation Permit

3. New service connection permit - GNHWPCA

END OF SECTION

SECTION 00 73 93 – ENVIRONMENTAL HEALTH AND SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

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

The Trade Contractor shall be responsible for the development, implementation and oversight of the HASP throughout the performance of work within the limits of the AOEC or HAOEC, as identified in the Contract Documents, and in other areas identified by the CTDOT PM or by the HASP where site conditions may pose a risk to worker health and safety and/or the environment. No physical aspects of the work within the AOEC or HAOEC shall begin until the HASP is reviewed by the CTDOT PM and is determined to meet the requirements of the specifications. However, the Contract time, in accordance with Division 01, will begin on the date stipulated in the Notice to Proceed.

1.2 EXISTING INFORMATION

A. The Trade Contractor shall utilize all available information and existing records and data pertaining to chemical and physical hazards associated with any of the regulated substances identified in the environmental site investigations to develop the HASP. A list of documents containing this data is found in Section 01 11 00 "Notice to Contractor – Environmental Investigations."

1.3 REGULATORY REQUIREMENTS

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

1.4 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures and Section 01 33 00.13 – Document Control for submittal procedures, except as modified herein.

B. Three copies of the HASP shall be submitted to the CTDOT PM within four (4) weeks after the Award of Contract or four (4) weeks prior to the start of any work in the AOEC, whichever is first, but not before the Award of the Contract.

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

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

C. HASP Provisions

1. General Requirements

The Trade Contractor shall prepare a HASP covering all Project site work regulated by 29 CFR 1910.120(b)/1926.65(b) to be performed by the Trade Contractor and all subcontractors under this Contract. The HASP shall establish in detail, the protocols necessary for the recognition, evaluation, and control of all hazards associated with each task performed under this Contract. The HASP shall address site-specific safety and health hazards of each phase of site operation

and include the requirements and procedures for employee protection. The level of detail provided in the HASP shall be tailored to the type of work, complexity of operations to be performed, and hazards anticipated. Details about some activities may not be available when the initial HASP is prepared and submitted. Therefore, the HASP shall address, in as much detail as possible, all anticipated tasks, their related hazards and anticipated control measures.

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

2. Elements

a. Site Description and Contamination Characterization

The Trade Contractor shall provide a site description and contaminant characterization in the HASP that meets the requirements of 29 CFR 1910.120/1926.65.

b. Safety and Health Risk Analysis/Activity Hazard Analysis

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

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

c. Staff Organization, Qualifications and Responsibilities

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

The Trade Contractor shall assign responsibilities for safety activities and procedures. An outline or flow chart of the safety chain of command shall be provided in the HASP. Qualifications, including education, experience, certifications, and training in safety and health for all personnel engaged in safety and health functions shall be documented in the HASP. Specific duties of each on-site team member should be identified. Typical team members include, but are not limited to Team Leader, Scientific Advisor, Site Safety Officer, Public Information Officer, Security Officer, Record Keeper, Financial Officer, Field Team Leader, and Field Team members.

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

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

1) Directing and implementing the HASP;

2) Ensuring that all Project personnel have been adequately trained in the recognition and avoidance of unsafe conditions and the regulations applicable to the work environment to control or eliminate any hazards or other exposure to illness or injury (29 CFR 1926.21). All personnel shall be adequately trained in procedures outlined in the Trade Contractor's written HASP;

3) Authorizing Stop Work Orders, which shall be executed upon the determination of an imminent health and safety concern;

4) Contacting the Trade Contractor's HSM and the CTDOT PM immediately upon the issuance of a Stop Work order when the HSO has made the determination of an imminent health and safety concern;

5) Authorizing work to resume, upon approval from the Trade Contractor's HSM;

6) Directing activities, as defined in the Trade Contractor's written HASP, during emergency situations; and

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

d. Employee Training Assignments

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

e. Personal Protective Equipment

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

f. Medical Surveillance Program

All onsite Contractor personnel engaged in 29 CFR 1910.120/1926.65 operations shall have medical examinations meeting the requirements of 29 CFR 1910.120(f) prior to commencement of work.

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

g. Exposure Monitoring/Air Sampling Program

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

h. Site Layout and Control

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

i. Communications

Written procedures for routine and emergency communications procedures shall be included in the Trade Contractor's HASP.

j. Personal Hygiene, Personal Decontamination and Equipment Decontamination

Decontamination facilities and procedures for PPE, sampling equipment, and heavy equipment shall be discussed in detail in the HASP.

k. Emergency Equipment and First Aid Requirements

The Trade Contractor shall provide appropriate emergency first aid kits and equipment suitable to treat exposure to the hazards identified, including chemical agents. The Trade Contractor will provide personnel that have certified first aid/CPR training on-site at all times during site operations.

l. Emergency Response Plan and Spill Containment Program

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

m. Logs, Reports and Record Keeping

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

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

n. Confined Space Entry Procedures

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

o. Pre-Entry Briefings

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

p. Inspections/Audits

The HSM or HSO shall conduct inspections or audits to determine the effectiveness of the HASP. The Trade Contractor shall correct any deficiencies in the effectiveness of the HASP.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 HASP IMPLEMENTATION

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

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

C. Disposable CPC/PPE (i.e. disposable coveralls, gloves, etc.) that come in direct contact with hazardous or potentially hazardous material shall be placed into 55 gallon USDOT 17-H drums and disposed of in accordance with federal, state, and local regulations. The drums shall be

temporarily staged and secured within a secure area of the Project, to be approved by the CTDOT PM, for management by others.

3.2 HASP REVISIONS

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

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

END OF SECTION 00 73 93

SECTION 01 11 00 SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Construction Documents and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. The General Conditions are contained within the Standard Form of Agreement between Owner and Contractor for Guaranteed Maximum Price (GMP) for New Haven Rail Yard Maintenance of Way Building Project # 301-0124.

C. The Contract shall be governed by the laws of the State of Connecticut.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Maintenance of Way Building, State Project No. 0301-0124 is to be located in New Haven, Connecticut. It is to be completed and ready for use by the Owner and Agency within the Contract Time specified in this Section.

B. Project Summary:

1. The project includes the construction of a building of approximately 31,300 gross square feet, adjacent site development at 1 Brewery Street, relocation of Brewery Street, and site development and construction at 152 Water Street.

2. The building is new and shall be constructed of materials that include, but are not limited to, the following: The structure shall consist of reinforced concrete and steel. Exterior wall construction shall include prefabricated metal panels and masonry. Roof construction shall consist of a membrane roof with pavers, flashings, vents, curbs, roof drains, and roof hatches(s). Foundations shall consist of precast concrete piles. Existing concrete Franki piles located on the existing site shall remain in place and shall be 'cut-off' by the Contractor. Interior finishes include painted gypsum board, porcelain tile, and concrete block and masonry. Floor coverings include porcelain tile and vinyl tile. Ceilings shall be acoustical tile, gypsum board, and metal panels.

3. The site work includes the relocation of Brewery Street, site and utility work to support the proposed MOW building, and site work in the Outdoor Storage Area (152 Water Street) located northeast of the MOW building; erosion and sediment control, environmental health and safety, and demolition included in the Civil scope of work. Also included are grading and stormwater management, site features, excavation and fill, paving, sidewalks, signage, striping, and fencing. Civil utility work in support of the building includes water, sewer, roof drain, electric, telecommunications, gas, and site lighting.

4. The Authority having jurisdiction for this Project is the CT Department of Construction Services, Division of Fire and Buildings Services (DF&BS):

a. Office of State Fire Marshal (OSFM) for compliance with the CT Fire Safety Code.

C. Project Location: The Maintenance of Way Building is located in New Haven, Connecticut.

D. Owner and Agency:

1. Owner: The Owner is the Department of Transportation, State of Connecticut (CT DOT).
2. The authorized representative for the Owner is Ms. Lynn Cichowski, PE, Assistant District Engineer, District 1A, CTDOT Project Manager (CTDOT PM). The CTDOT PM is located at 700 State Street, New Haven, CT 06511.
3. The Owner may appoint an Owner's Representative.

E. Engineer:

1. The Engineer or Engineering Firm is Parsons Brinckerhoff, located at 500 Winding Brook Drive, Glastonbury, CT 06033. Telephone: 860-659-0444
2. The Engineer or their accredited representative is referred to in the Contract Documents as "Architect" or "Architects" or "Engineer" or "Engineers" or by pronouns which imply them. As information for the Contractor, the Engineer's status is defined as follows:
   a. The Engineer will not make interpretations or decisions directly to the Contractor. All interpretations or decisions will be conveyed through the CTDOT PM to the Project Manager.
   b. As the authorized representative of the Connecticut Department of Transportation (CTDOT), the Engineer is responsible for review of shop drawings, RFIs, materials, and equipment intended for the work, in accordance with the "General Conditions", and the "Supplementary Conditions."
3. Wherever the Engineer or Engineers is mentioned in the documents in connection with an administrative function, it shall include the CTDOT PM in that function except for shop drawings.

F. CTDOT PM:

1. The CTDOT PM is District 1A Connecticut CTDOT and located at 700 State Street in New Haven, Connecticut.

   Telephone: 203-752-0113

   a. The CTDOT PM is referred to in the Contract Documents as "CTDOT PM" or by pronouns which imply it. All communications concerning the project will be directed through the CTDOT PM or a designated representative(s).
2. As information to the Contractor, the CTDOT PM's status is defined as follows:
   a. The CTDOT PM is the Owner's Agent who will, among other things, monitor the Contractor's performance, scheduling and construction, review and process periodic billings, review and recommend cost changes The CTDOT PM will process shop drawings, material/equipment submittals, and other submittals.
3. The CTDOT PM will resolve all requests for information, interpretations and decisions regarding the meaning and intent of the Contract Documents, consulting with appropriate parties, including the Engineer and others, prior to rendering the interpretations or decisions for the Contractor. All such requests and replies shall be in writing.

G. Project Description

The MOW building is a two story pile-supported steel-framed building with a loading dock on its eastern side. The loading dock allows access for materials and equipment to be loaded to and from the shops within the building that maintain the rails of the New Haven Line. The project also includes a parking lot to serve the adjacent Component Change Out Shop (CCO).

To provide outdoor storage of MOW materials, the project also includes the construction of an outdoor storage area located at nearby 152 Water Street.

The MOW building will be constructed on the site of a former Cold Storage Warehouse (Connecticut Freezers) that has been demolished in 2014. Existing concrete Franki piles located on the existing site shall remain in place and shall be 'cut-off' by the Contractor. The MOW outdoor material storage area will be constructed on the site of a former warehouse building that was demolished in late 2013. There are elements of the former foundations, concrete pile foundations and a sanitary pump station(s) that must be removed in order to accomplish the construction.

Subsurface gas, electric, water, sewer, communications, drainage lines and sanitary pump station will be installed to serve the MOW building as well as potential future projects nearby. The project also includes the relocation of Brewery Street which permits public access from Sargent Drive to points west.

The MOW building and associated work will be constructed adjacent to contractors engaged in work to construct on-going and future construction of yard improvements. Staged construction will be required to relocate existing parking areas used by railroad employees prior to the beginning of building construction.

NOTICEs TO CONTRACTOR are contained within these Specifications.

Environmental work associated with this facility may include work with polluted soils and groundwater, as further specified below in the NOTICE TO CONTRACTOR – ENVIRONMENTAL INVESTIGATIONS.

H. Work Includes, but is not limited to, the following:

1. Site Construction, Landscaping, Site Utilities

2. Cast-in-Place Concrete, Concrete walks and pads

3. Masonry

4. Structural Steel, Cold- Formed Metal Framing, Metal Stairs, Pipe Railings

5. Rough Carpentry, Architectural Wood Casework;

6. Waterproofing, Insulation, Air Barrier, Firestopping, Roofing, Sheet metal, and Joint Sealants

7. Composite Material Wall Panels; Prefabricated Hazardous Materials Structures; Fire Suppression Systems

8. Doors and Frames, Overhead Doors, Aluminum Windows, Aluminum Storefront, Hardware, Glazed Aluminum Curtain Wall and Skylights;;

9. Drywall, Floor Coverings, Tile, Acoustical Ceilings, and Painting;

10. Visual Display Boards, Toilet Compartments, Signage, Lockers, Fire Extinguishers, and Toilet Accessories;

11. Loading Dock Accessories, Dust Collector, Fittings and Fixtures, and Equipment;

12. Window Shades;

13. Passenger Elevator

14. Plumbing, Fire Protection, and HVAC systems; System Controls

15. Electrical and Fire Alarm Systems; Communications; Electronic Safety and Security

16. Special Equipment.

I. The Contractor shall include in his price all items required in order to carry out the intent of the Work as described, shown and implied in the Contract Documents.

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

K. The project is not intended for LEED Certification.

L. An independent Commissioning Agent has been hired by CTDOT. The Contractor and Trade Contractors shall participate in the commissioning process as described in the Contract Documents.

M. It is the Contractor's responsibility upon discovery to immediately notify the CTDOT PM, in writing, of errors, omissions, discrepancies, and instances of noncompliance with applicable codes and regulations within the documents, and of any work which will not fit or properly function if installed as indicated on the Contract Documents. Any additional costs arising from the Contractor's failure to provide such notification shall be borne by the Contractor.

N. The Work will be constructed under a Construction Manager at Risk contract.

1.3 WORK UNDER OTHER CONTRACTS

1. Demolition of the existing Cold Storage Warehouse on the site
2. Removal of contaminated soil on the site

B. Separate Contract: The Owner will award or has awarded separate contracts for performance of certain construction operations at the site. These operations will be conducted simultaneously to the work under this Contract. The separate contracts include the following:

1. Commissioning
2. Field testing and inspection of the Work by an independent testing laboratory or agency
3. Water treatment of dewatering wastewaters

C. Cooperate fully with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this contract.

1.4 FUTURE WORK

A. Future Contract: The Owner may award a separate contract for additional work to be performed at the site following Substantial Completion. Completion of that work depends on successful completion of work under this Contract.

1.5 CONTRACT TIME

A. The project shall be substantially complete, ready for occupancy within five hundred and thirteen (513) Calendar Days of commencement of the Work (the "**Contract Time**").

Liquidated damages for failure to achieve substantial completion within this time limit shall be three thousand four hundred dollars ($ 3,400.00) per calendar day.

B. 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 completed.

C. The Contract time will begin to run on the date designated in the CTDOT PM's “Notice to Proceed” as the date for commencement of the Project, and the time will be computed as herein provided on a consecutive-day basis, including all Saturdays, Sundays, holidays, and non-work days.

D. The Contractor's plea that insufficient Contract time was allowed under the Contract before commencement of the Project is not a valid reason for extending the Contract time. Requests for an extension of time, with adequate substantiation, and supported by the schedules submitted previously under the Project Coordinator Item (Level One or Two) as applicable, must be presented within 60 calendar days from the event that is the basis of the request or from the first effect of such an event on the Project. The Contractor will be responsible for providing all the documentation necessary to support the reasonableness of the additional time requested.

1.6 WORK SEQUENCE (STAGES)

A. The construction of the MOW Building shall be staged so that all New Haven Rail Yard operations and facilities will continue as normal without interruption unless specifically detailed in the Contract Documents.

B. The final Site and Building Staging Plan shall be developed by the Contractor.

C. Project to be staged in general conformance with Contract Staging Plans.

D. The Trade Contractor shall provide all temporary paved driveways, temporary entries, temporary walks, temporary services, select demolition, temporary ramps, and other temporary facilities to implement the project staging as shown on the plans or as directed by the CTDOT PM.

1.7 CONTRACTOR USE OF PREMISES

A. General: During the construction period the Contractor shall have full use of the newly constructed premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.

B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. In order to maintain the maximum number of parking spaces available to Railroad employees, the Contractor shall restrict its operations solely to the areas where construction activities included in this Project are shown on the Contract Documents. The Contractor shall not use New Haven Rail Yard (NHRY) parking spaces outside of these areas for storage of equipment or materials or for the parking of the Contractor’s or Trade

contractor's vehicles. If parking for the Contractor's needs is not available within said area, the Contractor shall be responsible for arranging off-site parking and the shuttling of employees to and from the work area.

The Contractor shall access the NHRY by the Brewery/Long Wharf Street entrance. The Hallock Avenue Entrance shall not be used.

The Contractor is hereby advised that due to the limited space available within the New Haven Rail Yard (NHRY), and multiple construction contracts taking place in the NHRY, the Contractor will be limited to locating Contractor office trailers and portable bathroom facilities within the limits of the Project work area. If the Contractor's requirement for trailer space cannot be accommodated within the designated area, the Contractor shall be responsible for locating Contractor office trailers off site at no expense to the Department.

Any MNRR Power Department material or equipment stored on the existing site shall be relocated by the Contractor, in coordination with MNRR Power.

The Contractor shall locate the Construction Field Office provided for use by the Department in the area indicated in the Contract Documents or as directed by the CTDOT PM.

The Contractor is advised that other contractors may be working within the New Haven Rail Yard adjacent to and concurrent with this project. The Contractor must share access and work areas with other such contractors.

There shall be no pile driving during any scheduled performances at Long Wharf Theatre, 222 Sargent Drive, New Haven, CT. The theatre's year-round schedule of performances shall consist of night shows five days per week starting at 7:00 pm and lasting for two hours, plus an average of two matinee shows per week starting at 2:00 pm and lasting for two hours.

2. The Contractor shall confine his operations including storage of materials, supplies, equipment, and apparatus to the areas bounded by the contract limits indicated and as directed in the Contract Documents.

3. Existing roads, drives, walks, and parking areas which are not within the contract limit line are to be kept free and clear at all times. All Contractors are to check all roadways for accessibility and clearances for deliveries of all large material and equipment. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

4. The Contractor shall be responsible for keeping the premises clean and shall pick up rubbish and debris and promptly remove from site.

5. Parking for the Contractor's employees will be limited to an area designated by the CTDOT PM, and the Contractor may be required to provide identification stickers for all employees' cars.

6. The Contractor is hereby advised that due to the restrictive Project Limits and the need to maintain the maximum number of parking spaces for Metro-North Railroad and Conn DOT Employees, and other operational constraints identified in the Contract, off-site staging and storage of materials and equipment will be required. Arrangement for off-site staging and storage of materials and equipment shall be the responsibility of the Contractor. The Contractor shall restrict its operations, including the need for parking for its employees,

trade contractors, and the CTDOT PM to the Project Limits depicted on the Contract plans. The Contractor shall bid the Project accordingly.

7. Special precautions shall be taken to protect all wetland areas designated to remain. Prevent any and all sediment, debris, or other materials from getting into these areas. Should any sediment, debris, or other materials get into these areas or if any damage occurs to the vegetation therein, the Contractor shall immediately contact the CTDOT PM for direction.

8. The Contractor shall comply with local working hour restrictions, unless specifically approved otherwise in writing by the Owner.

9. No signs, other than those approved by the CTDOT PM, will be visible on the premises.

The Contractor shall bid the Project accordingly.

1.8 OCCUPANCY REQUIREMENTS

A. Department of Transportation personnel and Metro-North Railroad personnel may occupy the Project Site during the entire construction period.

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

The CTDOT PM shall obtain from the Contractor written approval of such occupancy. The CTDOT PM shall determine whether such occupancy or use is possible and, if so, will make arrangements for holding a job inspection with representatives of the Department and the Contractor.

Based on the inspection, a "Punch List" of outstanding or unacceptable work shall be developed.

The Contractor shall prepare a letter to the CTDOT PM granting occupancy. The letter granting such occupancy shall state the terms and conditions of occupancy and include the status of completion of "Punch List" items.

Subsequent to the receipt of the letter granting occupancy, the CTDOT PM shall notify the Contractor in writing that fire insurance coverage has been requested, and the effective date the Contractor may cancel the fire insurance coverage normally carried on the building by it.

Prior to partial Department occupancy, all mechanical and electrical systems shall be fully operational. Required inspections, tests and commissioning shall have been successfully completed. Upon occupancy the CTDOT PM will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

1.9 OWNER-FURNISHED PRODUCTS

A. The Owner may furnish various products as indicated in the construction documents. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.

1. The Owner will arrange for and deliver necessary shop drawings, product data, and samples to the Contractor.
2. The Owner will arrange and pay for delivery of Owner-furnished items according to the Contractor's Construction Schedule.
3. Following delivery, the Owner will inspect items delivered for damage.
4. If Owner-furnished items are damaged, defective, or missing, the Owner will arrange for replacement.
5. The Owner will arrange for manufacturer's field services and for the delivery of manufacturer's warranties to the appropriate Contractor.
6. The Contractor shall designate delivery dates of Owner-furnished items in the Contractor's Construction Schedule.
7. The Contractor shall review shop drawings, product data, and samples and return them to the CTDOT PM noting discrepancies or problems anticipated in use of the product.
8. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements. The Contractor shall repair or replace items damaged as a result of his operations.

1.10 MISCELLANEOUS PROVISIONS

A. Examination of Site:

1. It is not the intent of the Documents to show all existing conditions.
2. Contractors should investigate and satisfy themselves as to the conditions affecting the work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, uncertainties of weather, roads or similar physical conditions of the ground, the character of equipment, and facilities needed preliminary to and during the prosecution of the Work. The Contractor should further satisfy himself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the Contract Documents. Any failure by the Contractor to acquaint himself with the available information shall not relieve him from the responsibility for estimating properly the difficulty and cost of successfully performing the Work.
3. Tests have been done for Asbestos containing Material (ACM), and/or Lead Containing Material (LBP), and the results are referenced in Section 00 31 00 Available Project Information.
4. Tests have been done for Work Involving
5. “Products Containing Persistent Bioaccumulative Toxic Chemicals” (PBT’s) such as Polychlorinated Biphenols (PCB’s), Di-2-ethylhexyl Phthalate (DEHP) and Mercury, and the results are referenced in Section 00 31 00 Available Project Information.
6. Subsurface Geotechnical Investigations:
   a. Geotechnical Reports(s) have been prepared for this project and they are referenced in Section 00 31 00 Available Project Information.
      i. The Contractor must interpret the Geotechnical Report (s) according to his own judgment and acknowledges that he is not relying upon the data as accurately describing the subsurface conditions which may be found to exist.

ii. The Contractor further acknowledges that he assumes all risk contingents upon the nature of the subsurface conditions, which shall be actually encountered by him in performing the Work of this Contract.

iii. The Contractor should visit the site and become acquainted with all existing conditions and may make their own subsurface investigations to satisfy themselves as to the subsurface conditions. Such investigations shall be conducted only under time schedules and arrangements approved in advance by the Owner.

7. Subsurface Contaminated Soils Investigations:

a. A Contaminated Soils Report has been prepared for this Project and it is referenced in Section 00 31 00 Available Project Information.

b. The Owner shall be responsible for the remediation and disposal of all Contaminated Soils when they are indicated in this report.

c. The Contractor shall be responsible for the requirements outlined within Section 00 73 93 Environmental Health and Safety Requirements.

d. If the Contractor should encounter any material suspected or known to contain Contaminated Soils **that was not previously identified in the Contaminated Soils Report and assigned as the Contractor's responsibility,** the Contractor should immediately notify the Owner of same. It is the State'' responsibility to have the material tested and abated (if necessary). The Owner will respond within **two (2)** calendar days after receiving the Contractor's written request for testing the suspect material. The Owner shall arrange for the remediation and disposal of all Contaminated Soils (if necessary) within a reasonable time period, i.e. within **seven (7)** calendar days.

e. No attempt has been made to locate hazardous material associated with existing site utilities, though it is presumed that at least some asbestos may be discovered associated with underground piping during the course of site and site utilities work. If and when such materials appear, the Contractor shall notify the Owner, who shall direct additional work outside of this Contract to assist in cutting up and disposing of same. The Contractor shall assist the hazardous materials contractor(s) with excavating, heavy lifting, and the like at no additional cost to the Owner.

B. Pre-Bid Conference:

1. A Pre-Bid Conference and tour of the site will be conducted as specified in the Notice to Bidders. This scheduled conference is the only official opportunity for the bidders to tour the site with the Owner, CTDOT PM, and Agency.

C. Pre-bid Questions and Answers:

1. 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.

2. 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.

3. Trade 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.

4. 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 documents.

5. Trade 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, etc., are made public on the State Contracting Portal and/or the CTDOT website.

D. Restricted Access to Security Contract Documents

1. Due to the sensitive nature of the information contained in the documents, the Contract documents (plans and specifications) for the Security portion of this project shall be restricted in their availability to bidders.

2. These plans and specifications will be made available at the Department's Office of Contracts for viewing by prospective bidders. Prospective bidders shall contact the Office of Contracts at 860-594-3127 or 860-549-3129 to arrange to view the Security plans and specifications. They are available for viewing Monday through Friday, 8:30 am through 4:00 pm, at the ConnDOT Office of Contracts, 2800 Berlin Turnpike, Newington, CT.

3. The plans and specifications are available for viewing only. No copies can be made of the plans or specifications. The plans and specifications cannot be removed from

ConnDOT offices. No extension of the bid period or postponement of the Bid Opening date will be considered as a result of this restriction.

4. The MTA Security Sensitive Handbook is available for viewing only.

5. This restriction applies to the Bidding phase only. Once the Contract has been Awarded, three (3) hard copy sets of the security plans and specifications will be provided to the Trade Contractor for use during construction, digital files will not be provided for these documents. The Trade Contractor will be required to sign a Confidentiality statement furnished by the Engineer that requires the Trade Contractor to agree to limit further distribution of these plans and specifications to only those parties that are required to possess the documents in order to perform Contract work. Making additional copies of these plans and specifications is prohibited.

6. The restricted Contract documents include Drawing Numbers W14-000 through W14-506, and Division 28 Specifications including Specifications 28 13 00 "Access Control System" and 28 23 00 "Video Surveillance System.

E. Project Documents:

1. The Specifications and Drawings are intended to describe and illustrate the materials and labor necessary for the work of this Project.

2. Throughout the documents Connecticut Department of Transportation Standard Drawings include Form 816 references. Other references to Form 816 may occur in the Documents. The Contractor shall disregard any and all material and pay limit references to Form 816.

F. Scope Review:

1. Prior to signing a Contract with the State, CT DOT will conduct a full scope review to ensure that all of the requirements have been included within the bid. This scope review will highlight all of the specific requirements of the project, a review of the DOT procedures and all of the Technical sections of the contract documents.

2. This process will ensure that all of the scope of work included in the contract documents has indeed been included.

G. Construction Responsibility:

1. The Contractor shall be responsible for his construction means, methods, techniques, sequences, and procedures employed in the performance of his work and shall have full responsibility for his failure to carry out any part of his work in accordance with the contract Documents.

H. The Contractor shall compile evaluation information during the performance of the contract on each of its trade contractors who are performing work with a value in excess of five hundred thousand dollars ($500,000.00). The Contractor shall complete and submit to the State of Connecticut Department of Transportation (CTDOT) evaluations of each such trade contractor upon fifty percent (50%) completion of the project and upon Substantial Completion of the project. The Contractor acknowledges that its failure to complete and submit these evaluations in a timely manner may, by statute, result in a delay in project funding and, consequently, payment to the Contractor. The Contractor agrees to indemnify and hold the State harmless from any loss, damage, or expense that results from or is caused

by the Contractor's failure to complete and submit the evaluations to CTDOT in accordance with this provision.

I. PAINTED SAFETY MARKINGS

The Contract Documents depict painted safety markings (09 90 00, Painting and Coating) to be applied to floors in the MOW Building. This work shall be performed by the Contractor.

The Contractor will provide the CTDOT PM with a minimum of 7 calendar days' notice of Contractor's intent to install safety markings. The CTDOT PM will coordinate the location of all safety markings with the Conn DOT Safety Division and Metro-North Railroad.

J. SOLE SOURCE PRODUCTS

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

Lenel Access Control System (CSI Section 28 13 00 - Access Control)
Axis Communications IP Cameras
Pelco DSS Series NVR
Great Lakes Communications cabinets and racks
Denios Storage Units

No "OR EQUALS" will be permitted for these products. Specified products shall be installed only by their factory authorized installer or service representative.

K. ELECTRICAL POWER TO SITE

The Contractor is hereby advised that temporary electrical power may not be readily available to this Project and the use of portable generators may be required. The Contractor is advised that it may be necessary to coordinate the installation of electrical power, including temporary power, to the site early in the construction process. The New Haven Rail Yard electrical distribution system is owned by the Department and operated by Metro-North Railroad.

The New Haven Railyard electrical system shall not be the source of temporary electrical power.

The Contractor shall coordinate this activity with the CTDOT PM and Metro-North Railroad for work depicted on the Contract Documents.

The Contractor shall bid the Project accordingly.

The Contractor shall also coordinate with United Illuminating for temporary services.

L. CONTRACT DURATION

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

M. PROCUREMENT OF MATERIALS

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

The Contractor shall not purchase or install communications and data equipment, devices, cabling, cable trays, etc without consulting with and obtaining approval from the MetroNorth IT Department.

N. 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.

O. NCHRP 350 REQ. FOR WORK ZONE TRAFFIC CONTROL DEVICES

<u>CATEGORY 1 DEVICES</u> (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 CTDOT PM a copy of the manufacturer's self-certification that the devices conform to NCHRP Report 350.

<u>CATEGORY 2 DEVICES</u> (construction barricades, construction signs and portable sign supports)

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

Specific requirements for these devices are included in the Project Specifications.

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

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

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

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

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

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

P. NOTICE TO CONTRACTOR – ARCHAEOLOGICAL MONITORING

The Trade Contractor is advised that a portion of the project area has been identified by the Federal Railroad Administration and the Federal Transit Administration in consultation with SHPO as having archaeological sites connected with the Long Wharf pier structure and a roundhouse from a former railroad. Any excavation greater than one foot below grade in areas at the 152 Water Street work site must be monitored for archaeological impacts. A minimum of two weeks advanced notice to the CTDOT PM of excavation greater than one foot below grade must be provided in order to schedule the Archaeologist to monitor the excavation.

Fitzgerald & Halliday, Inc.
416 Asylum Street
Hartford, CT 06103
860-247-7200

The Trade Contractor shall bid the Project accordingly.

Q. NOTICE TO CONTRACTOR DEMOLITION & HAZARDOUS MATERIALS ABATEMENT

The Contractor is hereby notified that project areas once contained structures that were demolished and required hazardous materials abatement. If materials that are suspected to contain hazardous materials are discovered by the Contractor they shall immediately notify the CTDOT PM. The CTDOT PM will either direct the Contractor to abate the materials or the Department will engage a specialty Contractor to abate the materials. In the event that a specialty contractor is engaged by the Department, the Contractor shall coordinate their work with that of the Department's specialty contractor for the abatement.

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

Abatement and demolition activities will require the services of specialty contractors retained by the Contractor or the Department holding certain specific licenses and/or personnel with

specific training (e.g. Demolition Contractor, Spill Contractor, Haz-Com Trained Personnel, Waste Transporters, Disposal Facilities, etc.), as well as the submission of specific notification forms, permits, postings, certifications, and/or work plans (e.g. demolition permits, notice to abutters, intent to demolish postings and legal notices, demolition notifications, disposal facility material acceptance certifications, transporter and disposal facility permits, waste shipment records/manifests/bills of lading, etc.)

The Sections which contain requirements for the Contractor work include the following:

- Section 00 73 93 – Environmental Health and Safety Requirements
- Section 02 67 00 – Removal and Disposal of Contaminated Railroad Ties

R. MIX DESIGNATION EQUIVALENCY

Section 32 12 16 of these specifications reflect changes in mix designations for various types of hot-mix asphalt (HMA). The following table is to be used to associate mix designations noted on the plans with that in the contract specifications and related documents. Mix designations on each row are equivalent and refer to a single mix, which shall be subject to the requirements of the Section 32 12 16.

Mix Designation Equivalency Table

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

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

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

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

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

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

S. NOTICE TO CONTRACTOR – SUPERPAVE DESIGN LEVEL INFORMATION

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

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

Mix Designation	**PG Binder**		**Project Wide**
	PG 64-22	**PG 76-22**	**Design Level**
HMA S0.25	-	-	-
HMA S0.375	-	-	-
HMA S0.5	X	-	3
HMA S1	-	-	
PMA S0.25	-	-	-
PMA S0.375	-	-	-
PMA S0.5	-	-	-
PMA S1	-	-	-

T. VEHICLE EMISSIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

U. GENERAL PERMIT FOR STORMWATER DISCHARGE

This notice is provided to summarize the requirements of the Connecticut Department of Environmental Protection's General Permit for the Discharge of Stormwater and Dewatering Wastewaters associated with Construction Activities (Permit) issued on August 21, 2013. When construction activities will result in the disturbance of a total of 1 acre (0.4047 ha) or more of land regardless of phasing, the Connecticut Department of Transportation (Department) will incorporate a Stormwater Registration (Registration) and Stormwater Pollution Control Plan (SWPCP) as part of the Contract documents in order to insure compliance with all conditions of this Permit. The Permit's 'Construction activities' means activities including but not limited to clearing and grubbing, grading, excavation, and dewatering.

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

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

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

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

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

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

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

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

The permittee shall amend the SWPCP whenever there is a change in Contactors or trade contractors at the site, or a change in design, construction, operation, or maintenance at the site which has the potential for the discharge of pollutants. In all cases as described above, the amended SWPCP shall adhere to and comply with paragraph 1 below. No additional payment will be made for any Permit amendment, modification, or revision which alters the Contract Plans, SWPCP, and/or estimated quantities as a result of the Department's approval of the modifications to the Contract by the Contractor. Changes or variations to the Contract Plans and/or SWPCP by the Contractor shall not result in any additional cost to the State.

1. **General:** This Section identifies those construction activities and other activities under the Department's control or jurisdiction which may have a negative effect on the environment, including the State's native waters and natural resources; and to prevent or minimize any damage to the environment which might result from such activities, either during or following the completion of any transportation Project.

   The Contractor shall comply with all Project permits and permit applications as though the Contractor were the permittee. If at the time the permit is issued, its contents differ from those outlined in the application, the permit shall govern. Should the permit be issued after the solicitation of bid proposals, and should the permit requirements significantly change the character of the work as described in the proposals, Contract adjustments will be made in accordance with the applicable articles in Section 1.04.

   This Section reinforces those environmental protection requirements which the Contractor is bound to meet under the Contract, or under Federal or State laws or regulations. If the Contractor fails to comply with environmental provisions of the

Contract or the law, the Contractor shall be penalized as prescribed in this Section and elsewhere in the Contract.

2. **Compliance with Laws and Regulations:** The Contractor shall conduct its operations in conformance with Federal and State permit requirements concerning water, air and noise pollution, and the disposal of controlled or hazardous materials. Permit requirements include, but are not limited to, those established by Federal regulations administered by the United States Coast Guard, Army Corps of Engineers, or Environmental Protection Agency.

   Appropriate permits shall be required for all activities associated with or incidental to the Contractor's operations, including, but not limited to, those regarding the Project site or adjacent areas, waste and disposal areas, borrow and gravel banks, storage areas, haul roads, access roads, detours, field offices, or any other temporary staging areas. The Contractor shall be responsible for, and hold the State harmless from, any penalties or fines which may be assessed by any authority due to the Contractor's failure to comply with any term of an applicable permit.

   The Department will be responsible for obtaining all environmental permits required for Contract work. Any request by the Contractor for authorization of activities or methods not specifically called for or allowed by the applicable permits issued for the Project must be submitted by the Contractor in writing to the CTDOT PM. Such a request must include a detailed description of the proposed activities or methods, and must include justifications for same, along with supporting documentation, showing that the proposed activity or method will not create a risk of damage to the environment. If such request is granted by the CTDOT PM, the Department will process an application to the appropriate regulatory agency or agencies for any permit amendment, modification, revision or new permit required for the Contractor to carry out the changed activities or methods in question. The Department does not, however, guarantee that it will be able to obtain the desired permit amendment, modification or revision; and the Department will not be liable for the effects of any inability to do so.

   The Contractor will not be entitled to any extension of Contract time as a result of the CTDOT PM 's granting of the Contractor's request. If the amendment, modification, or revision of the permit is not necessary except to make possible the changes requested by the Contractor, then no claim may be made by the Contractor based on the amount of time taken by the Department to review the Contractor's proposal, or to apply for or secure the permit amendment, modification or revision. No such proposed additional activity shall commence, nor shall such a changed method be used, until and unless the CTDOT PM approves in writing the Contractor's request.

   In case of a failure by the Contractor to perform pollution control work as required by the CTDOT PM, the CTDOT PM may, after having given the Contractor 24 hours advance written notice of its intention to do so, arrange for said work to be performed by other forces, and will deduct the cost from any monies due or which may become due to the Contractor under the Contract or under any other State contract.

3. **Water Pollution Control:**

   A. In relation to its Project work, the Contractor shall, throughout the duration of the Contract, control and abate siltation, sedimentation and pollution of all waters,

including but not limited to underground water systems, inland wetlands, and tidal, coastal, or navigable waters. Construction methods proposed by the Contractor must conform to permit application and permit requirements. The Contractor shall assume responsibility for all obligations and costs incurred as a result of the Contractor's failure to comply with the terms and conditions of such applications or permits.

The Contractor shall obtain any permits and pay any fees required for the performance of Project work which is not in the original Contract and (i) which has been made necessary by a failure of the Contractor to comply with any Contract water pollution control requirement, (ii) which is proposed by the Contractor and accepted by the CTDOT PM, (iii) which is to be performed outside the Project limits, (iv) which will involve or necessitate water-handling activities, including, but not limited to, the removal of material from, deposit of materials into, obstruction of, construction within, alteration or pollution of, any inland wetland, tidal wetland, coastal or navigable water, stream, pond, lake, water supply, other body of water or other regulated area.

B. Provisions of the best management practices may be superseded by specific permits from the DEEP The Contractor shall not make any design change in the Contract work which requires a variance from the requirements of the following items until and unless the Contractor has first submitted a detailed written proposal for such change to the CTDOT PM for review by the Department and for transmittal to and review by the DEEP, and has then received written approval from the Department of the proposed variance.

BEST MANAGEMENT PRACTICES

a. No Project construction shall proceed until (i) the Contractor has submitted in writing to the CTDOT PM its erosion and sedimentation control plans for all Project construction; (ii) the CTDOT PM has given in writing his approval of said plans; and (iii) the Contractor has installed all erosion and sedimentation controls called for by said plans approved by the CTDOT PM. Such plans shall be consistent with the Connecticut Council on Soil & Water Conservation's "Connecticut Guidelines for Soil Erosion and Sediment Control" (which is available from the DEEP) and with the version of the Department's "On Site Mitigation for Construction Activities" which is in effect at the time that Contract bid proposals are solicited.

b. Fueling of equipment or machinery within 25 feet of any wetland or watercourse shall be allowed only with the advance written approval of the CTDOT PM.

c. No Project construction shall proceed unless and until a written proposal of methods to prevent construction debris, paint, spent blast materials, or other materials from entering any wetland or watercourse has been submitted by the Contractor and approved by the CTDOT PM in writing; and until such methods have been implemented as the CTDOT PM directs. Such materials shall be collected and disposed of in accordance with all applicable Federal and State laws and regulations. The CTDOT PM may order the Contractor to cease such activity if, in the opinion of the CTDOT PM, weather conditions threaten to

cause the deposit of such materials into a wetland or watercourse.

d. No materials resulting from Project construction activities shall be placed in or allowed to contribute to the degradation of a wetland or watercourse. Disposal of any material shall be in accordance with Federal and State laws and regulations.

e. Fording of streams with equipment shall be prohibited, except as approved by the CTDOT PM. Such equipment travel shall be minimized. When frequent equipment travel on stream banks and beds is necessary, the Contractor shall place washed stone as and where necessary in order to minimize erosion, scour, and turbidity; but the Contractor must not do so in a way that will create a significant grade change in the wetland or watercourse.

f. All off-site disposal locations for material and debris resulting from Project construction shall be submitted in writing to the CTDOT PM in advance of their use, and the CTDOT PM shall determine if they are acceptable. The Contractor shall ensure that such locations are outside of wetlands or watercourses, floodplains and stream channel encroachment lines, unless otherwise approved by local, state, or Federal agencies with jurisdiction over the matter. Copies of such approvals shall be kept at the Project site by the CTDOT PM in the environmental inspection folder. Furthermore, the Contractor shall ensure that material from the Project is not placed within an area that has a better water quality classification than does the area from which it was taken, as indicated by the latest DEEP Water Quality Classifications Maps. Any proposed location for disposal of material within a State right-of-way must also be submitted in advance by the Contractor in writing to the CTDOT PM for subsequent review and approval by the Office of Environmental Planning and the Office of Engineering.

g. A construction-sequencing plan and a water-handling plan, including a contingency plan for flood events, must be submitted by the Contractor in writing to the CTDOT PM, and approved by the Engineer, prior to the commencement of any Project construction in a waterway. Water shall be kept deep enough in the channel to allow for the passage of fish and the continuous flow of the watercourse unless the CTDOT PM directs otherwise. Any revised version of the water-handling plan must be capable of accommodating a two-year storm. Any water-handling system that may be in place longer than 6 months must be designed in accordance with the Department's Drainage Manual.

h. When dewatering is necessary, pumps used for same shall not be allowed to discharge directly into a wetland or watercourse. Prior to any dewatering, the Contractor must submit to the CTDOT PM a written proposal for specific methods and devices to be used for same, and must obtain the CTDOT PM 's written approval of such methods and devices, including, but not limited to, the pumping of water into a temporary sedimentation basin, providing surge protection at the inlet or outlet of pumps, floating the intake of a pump, or any other method for minimizing and retaining the suspended solids. If the CTDOT PM determines that a pumping operation is causing turbidity problems, the Contractor shall halt said operation until a means of controlling

the turbidity is submitted by the Contractor in writing to the CTDOT PM, approved in writing by the CTDOT PM and implemented by the Contractor.

i. Work within or adjacent to watercourses shall be conducted during periods of low flow, whenever possible. The CTDOT PM shall remain aware of flow conditions during the conduct of such work, and shall order such work stopped if flow conditions threaten to cause excessive erosion, siltation or turbidity. The Contractor shall make every effort to secure the work site before predicted major storms. A major storm shall be defined as a storm predicted by NOAA Weather Service with warnings of flooding, severe thunderstorms, or similarly severe weather conditions or effects. Unless allowed by a DEEP permit, no materials shall be stored and no staging areas shall be placed below the 100-year elevation. Materials which are buoyant, hazardous, flammable, explosive, soluble, expansive, radioactive, and any other materials that could be injurious to human, animal or plant life in the event of a flood shall not be stored below the 500-year flood level.

j. All temporary fill shall be stabilized to prevent erosion and shall be contained so as to prevent sediment or other particulate matter from entering a wetland or watercourse. All areas affected by temporary fills must be restored to their original contours or as directed by the CTDOT PM, and vegetated. Temporary fill shall be placed and excavation shall occur only as and where necessary for Project construction, as determined by the CTDOT PM.

k. The Contractor shall perform seeding within 7 days of reaching an appropriate grading increment, as determined by the CTDOT PM. If the CTDOT PM directs the Contractor, or if the Contractor intends, that a grading operation will be suspended for a period of 30 or more consecutive days, the Contractor shall, within the first 7 days of that period, accomplish required seeding, or take such other measures to stabilize the soil as may be required by the CTDOT PM.

l. Dumping of oil, chemicals or other deleterious materials on the ground or into a watercourse is forbidden. The Contractor shall provide a means of catching, retaining, and properly disposing of drained oil, removed oil filters, and other deleterious material. The Contractor shall immediately report all spills of such materials to the CTDOT PM and the DEEP.

m. All application of herbicides or pesticides within 25 feet of any wetland or watercourse is prohibited. All permitted applications of such materials must be done by a Connecticut-licensed applicator. The Contractor shall submit in writing to the CTDOT PM the proposed applicator's name and license number, and must receive the Engineer's approval of the proposed applicator, before such application may be performed.

C. During spawning seasons and in spawning areas, as defined in the Contract, discharges and construction activities shall be restricted so as not to disturb or inhibit aquatic species indigenous to the waters. If the Contractor wants to make a change in construction operations or scheduling which would affect the use of or necessity for any pollution controls, the Contractor must submit before beginning to implement those changes a written proposal detailing them to the CTDOT PM, and must receive the CTDOT PM 's approval of those changes before beginning to

make them. Such submission must include a plan showing what erosion and sedimentation controls above and beyond those called for in the Contract would be necessitated by the proposed change.

D. The Contractor shall inspect erosion and sedimentation controls immediately after each rainfall of at least 0.1 inch, and at least daily during prolonged rainfall. The Contractor shall maintain all erosion and sedimentation control devices in a functional condition, in accordance with the "Connecticut Guidelines for Soil Erosion and Sediment Control," as revised, and the Department's "On Site Mitigation for Construction Activities," as revised. In the event that the Contractor fails to maintain such devices in accordance with such documents, and the Contractor does not correct said failures within 24 hours after receipt of written notice of such failures from the CTDOT PM, the Department may proceed with its own or other forces to remedy such failures. The cost to the Department of curing any such specified failure will be deducted from monies owed to the Contractor under the Contract or under any other State contract.

4. **Air Quality Control:** The Contractor shall exercise every reasonable precaution throughout the duration of the Contract to safeguard the air resources of the State by controlling and abating air pollution in accordance with the DEEP's regulations. These measures shall include the control and abatement of dust, mist, smoke, vapor, gas, aerosol, other particulate matter, odorous substances and any combination thereof arising from Project operations, hauling, storage, or manufacture of materials. The Contractor shall be responsible for obtaining any permits necessary for the operation of its Project equipment including but not limited to crushers, compressors and generators.

5. **Noise Pollution:** The Contractor shall take measures to control the noise caused by its construction operations, including but not limited to noise generated by 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 CTDOT PM. The maximum allowable level of noise at the residence or occupied building nearest to the Project site shall be 90 decibels on the "A" weighted scale (dBA). The Contractor shall halt any Project operation that violates this standard until the Contractor develops and implements a methodology that enables it to conduct its Project operations within the 90-dBA limit.

6. **Protection of Archaeological and Paleontological Remains and Materials:** The Contractor shall be alert to the possibility that, during the prosecution of the Project, significant archaeological or paleontological remains or other such materials may be uncovered. When archaeological or paleontological materials are uncovered, the Contractor shall immediately halt operations in the location of same and shall notify the CTDOT PM of said discovery. The Contractor shall make every effort to preserve archaeological or paleontological materials intact in their original positions, in order to preserve the archaeological or paleontological nature and importance of such materials in relation to one another and to the enclosing soil.

   The CTDOT PM shall have the authority to suspend Project work in the area of such discovery for the purpose of preserving, documenting and recovering the archaeological or paleontological materials. The Contractor shall carry out all instructions of the CTDOT PM for the protection of such materials, including steps to

protect the site from vandalism and unauthorized investigations, from accidental damage and from dangers such as heavy rainfall or runoff. The Contractor shall reschedule its work to minimize any loss of the time needed to complete the Project while the State evaluates, records and salvages the archaeological or paleontological materials.

Extra work ordered by the CTDOT PM in this connection will be paid for in accordance with Articles 1.04.05 and 1.09.04. Delays caused by archaeological or paleontological preservation and protection, which the Contractor demonstrates have delayed completion of the Project, will be treated under the provisions for extension of time, Article 1.08.08.

7. **Controlled and Hazardous Materials:** The Department will acquire any "Hazardous Waste Generator Permit(s)" required under the Resource Conservation and Recovery Act, for the management and disposal of hazardous materials on the Project site, provided that:

   A. Such material is within the construction limits defined in the Contract,

   B. Such material is not comprised of waste materials generated by the Contractor.

   If the Department has designated in the Contract, an area of known or suspected contamination within the Project limits, the Contractor shall dispose of such material in accordance with the relevant project specifications.

   In the event that the Contractor encounters or exposes any material, not previously known or suspected to be contaminated, but which exhibits properties that may indicate the presence of controlled or hazardous material, the Contractor shall cease all operations in the material's vicinity, and shall immediately notify the CTDOT PM of the material's discovery. The presence of barrels, discolored earth, metal, wood, visible fumes or smoke, abnormal odors or excessively hot earth may indicate the presence of controlled or hazardous material, and shall be treated with extreme caution.

   If controlled or hazardous materials, other than those required for Contract operations, are discovered at the Project site, the Department may engage a specialty contractor to handle and dispose of the materials. When the Contractor performs support work incidental to the removal, treatment or disposal of controlled or hazardous material, the Department will pay for same at the applicable Contract unit prices. When the Contract does not include appropriate pay items, payment will be made in accordance with Article 1.04.05. The Contractor shall observe all security precautions established pursuant to 29 CFR 1910.120 and 1926.65, including all revisions and amendments thereof, and shall not work in any area known to contain or suspected of containing controlled or hazardous material without prior written approval from the CTDOT PM.

   The Contractor shall assume sole responsibility for the proper storage, handling, management, and disposal of all regulated materials and wastes associated with its operations, including, but not limited to, lubricants, antifreeze, engine fluids, paints, and solvents. All costs associated with any failure by the Contractor to properly manage such materials in accordance with Federal and State regulations,

and all remedial and punitive costs incurred by the Department as a result of such failure shall be borne by the Contractor.

This article does not apply to coatings removed by the Contractor.

8. **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),

   (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 to sensitive receptors. No work will proceed until a sequence of construction and a Vehicle Emissions Mitigation plan is submitted in writing to the CTDOT PM for review and all comments are addressed in a manner acceptable to the CTDOT PM. 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".

V. ENVIRONMENTAL COMPLIANCE

The Contractor is hereby notified that the State listed threatened species American kestrel (Falco sparverius), is present within the Project limits. In Connecticut, this small falcon prefers open grassy or shrubby areas with low vegetation to hunt for their prey. Kestrels are usually seen around agricultural areas, airports, large parks, and power line right-of-ways. It is not unusual to find kestrels using urban and suburban areas and even buildings for nest sites. Connecticut's nesting kestrels begin courtship in late March and an average of 4-5 eggs are laid by the end of April in a natural tree cavity or man-made nest box on little to no nesting materials.

If work must be done during the American kestrels nesting active period (March 15 to August 1) the Department will require precautionary measures to protect the American kestrel and American kestrel habitat. All construction activities taking place within the kestrel's active nesting period will need to be coordinated with the Department.

The Contractor shall through the CTDOT PM at least 10 days prior to the commencement of any construction activities, arrange for a CT DOT Environmental Inspector from the Office of Environmental Planning (OEP) or their authorized delegate to be available to meet and discuss proper protocol for maintaining environmental commitments made to the protection of this species and habitat. OEP will provide oversight through the District to ensure that the following protocols are followed and maintained during the course of the Project:

a. A nesting box will need to be constructed and placed in a preferred location determined by DEEP Wildlife staff. Kestrel nest box plans are available from DEEP Wildlife.

b. All staging and storage areas, outside of previously paved locations, regardless of the duration of time they will be utilized, must be reviewed by and receive written approval from OEP through the District.

This species is protected by state laws which prohibit killing, harming, taking, or keeping them in your possession. Workers shall be notified of the existence of American kestrels in this area and be apprised of the laws protecting them. Photographs and the laws protecting American kestrels (species ID sheets will be provided by OEP and is included below) shall be posted in the Contractor's and DOT field office. Any observations of this species are to be immediately reported to OEP at (860) 594-2937or (860) 594-2938.

American kestrel

Falco sparverius

State threatened species

The slender American kestrel is roughly the size and shape of a mourning dove, although it has a larger head; longer, narrow wings; and long, square-tipped tail. In flight, the wings are often bent and the wingtips swept back. American Kestrels are pale when seen from below and warm, rusty brown spotted with black above, with a black band near the tip of the tail. Males have slate-blue wings; females' wings are reddish brown. Both sexes have pairs of black vertical slashes on the sides of their pale faces. If any kestrels are observed in or around the project area the Office of Environmental Planning must be notified at 860-594-2938.

W. BID RIGGING AND/OR FRAUDS

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 frauds.

A toll-free "HOT LINE" telephone number 800-424-9071 has been established to receive information from contractors, trade contractors, manufacturers, suppliers or anyone with knowledge of bid rigging and/or frauds either past or current. The "HOT LINE" telephone number will be manned during normal working hours (8 A.M. - 5 P.M. EST.), and information will be treated confidentially and anonymity respected.

X. RIGHTS OF WAY RESTRICTIONS

The Contractor is hereby advised that at the time of advertising for bids not all the property may be acquired by the State. A complete listing of the affected properties and the anticipated dates that they will become available is hereinafter provided. 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 properties that are un-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 of residences (businesses, farms, or non-profit organization) who have not yet moved from the right-of-way.

2) Construction award and Notice to Proceed may occur prior to acquisition and/or vacation of properties listed. If this occurs operations shall be planned and conducted with consideration for each of the properties listed herein.

3) The Contractor shall be aware that extensions of time will be granted, if necessary, for delays in construction operations caused by properties being un-acquired or asbestos abatement concluding beyond the estimated time period.

The following is a complete listing of properties which have not been acquired, vacated and asbestos abated as of December, 2015, with the anticipated dates such properties will be acquired and/or vacated and abated.

1. Hummel Bros. Inc.
2. IKEA Property, Inc.
3. New Haven Food Terminal, Inc.

More details on specific activities and limits of the affected parcels are depicted on copies of the property maps within the General Deliverables section of the contract plans.

Y. CONNECTICUT DEPARTMENT OF TRANSPORTATION DISCLAIMER

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

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

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

Z. REQUIREMENTS OF TITLE 49, CODE OF FEDERAL REGULATIONS PART 26

The Construction Manager, Contractor, sub-recipient or Trade Contractor 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 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.

AA. UTILITY SPECIFICATIONS

The Contractor is hereby notified that all relevant utility specifications 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. The Contractor shall fill out and submit all required forms and applications to obtain permits from the utility companies required for the work.

BB.VOLUNTARY PARTNERING

The Connecticut Department of Transportation (Conn DOT) intends to encourage the foundation of a cohesive partnership with the Contractor and its principal trade contractors 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 Conn DOT 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 Conn DOT District Engineer and key project personnel, the Contractor's on-site project manager and key supervision personnel of both the

prime and principal trade contractors. 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 Conn DOT.

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.

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

CC. CONTRACTOR TRAINING REQUIREMENT FOR 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE

In accordance with Connecticut General Statute 31-53b and Public Act No. 08-83, the Contractor is required to furnish proof that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53, 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.

Proof of compliance with the provisions of the statute shall consist of a student course completion card issued by the federal Occupational Safety and Health Administration, or other such proof as deemed appropriate by the Commissioner of the Connecticut Department of Labor, dated no earlier than five years prior to the commencement of the project. Each employer shall affix a copy of the construction safety course completion card for each applicable employee to the first certified payroll submitted to the Department of Transportation on which the employee's name first appears.

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.

This section does not apply to employees of public service companies, as defined in section 16-1 of the 2008 supplement to the General Statutes, or drivers of commercial motor vehicles driving the vehicle on the public works project and delivering or picking up cargo from public works projects provided they perform no labor relating to the project other than the loading and unloading of their cargo.

The internet website for the federal Occupational Safety and Health Training Institute is http://www.osha.gov/fso/ote/training/edcenters.

Additional information regarding this statute can be found at the Connecticut Department of Labor website, http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm.

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 "Claims".

DD. 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):

CSI Section	07 14 00,	Fluid-Applied Waterproofing
CSI Section	07 21 00,	Thermal Insulation
CSI Section	07 42 64,	Aluminum Composite Material Wall Panels
CSI Section	07 54 00,	Thermoplastic Membrane Roofing
CSI Section	07 62 00,	Sheet Metal Flashing and Trim
CSI Section	07 84 00,	Firestopping
CSI Section	07 90 05,	Joint Sealants
CSI Section	08 80 00,	Glazing
CSI Section	09 30 00,	Tiling
CSI Section	09 51 00,	Acoustical Ceilings
CSI Section	09 65 00,	Resilient Flooring
CSI Section	21 05 00,	Common Work Results for Fire Suppression
CSI Section	22 00 00,	Plumbing
CSI Section	22 07 00,	Plumbing Insulation

CSI Section	23 05 00,	Common Work Results for HVAC
CSI Section	23 07 13	Duct Insulation
CSI Section	23 31 13,	Metal Ducts
CSI Section	23 33 00,	Air Duct Accessories
CSI Section	23 74 13,	Packaged, Outdoor, Rooftop Air-Handling Unit
CSI Section	26 05 00,	Common Work Results for Electrical
CSI Section	26 05 19,	Low-Voltage Electrical Power Conductors and Cables
CSI Section	26 05 33,	Raceway and Boxes for Electrical Systems
CSI Section	28 05 13,	Conductors and Cables for Electronic Safety and Security

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 incurs 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

EE. NOTICE TO CONTRACTOR – COMPLIANCE WITH MTA SECURITY SENSITIVE INFORMATION HANDBOOK

The procedures identified in the latest version of the MTA SECURITY SENSITIVE INFORMATION HANDBOOK (provided with the restricted contract documents) are to be understood and implemented by vendors furnishing and installing security-related items for this project, as depicted in the restricted contract documents outlined in the provision RESTRICTED ACCESS TO SECURITY CONTRACT DOCUMENTS within Section 01 11 00 sub-article 1.10.D.

The procedures in the handbook employ safeguarding requirements of control and accountability, storage, disclosure, reproduction, transmission, document shipment, disposition and labeling. The handbook is used to safeguard MTA Security Sensitive Information and to control its authorized disclosure both internally within the MTA as well as to outside entities and individuals.

FF. NOTICE TO CONTRACTOR – SITE SECURITY AND ACCESS

The New Haven Rail Yard is a secure site with controlled access and considered part of Metro-North Territory. During construction, the Trade Contractor must adhere to all security requirements. These requirements apply to the Trade Contractor, Trade Contractors, material and equipment suppliers, and any other related personnel working on the project. These security procedures are outlined in this specification section. Most project work areas are outside of the New Haven Rail Yard. The assumed limits of the Rail Yard at the time of MOW construction are delineated on the plans and are subject to change as portions of the CCO and CDW project sites become incorporated into the Rail Yard. The Trade Contractor shall verify the limits of what is considered to be the Rail Yard prior to making electrical, security, communication and de-watering service connections or conducting certain activities as directed by the CTDOT PM in order to determine if MNR security, flagging, safety training, and other MNR requirements are required.

All employees of the Contractor and its trade contractors must obtain a New Haven Rail Yard photo identification security badge (badge) which shall be visible at all times. The Contractor shall be responsible for all employees and trade contractor badging requirements, including producing the badges, identification photographs, application forms, plus associated data management, archiving, and oversight. The Contractor shall appoint an "Authorized Security Supervisor" (Security Supervisor) to conduct these activities. The Security Supervisor will be dealing with sensitive security information and therefore shall not be a convicted felon. The Security Supervisor shall complete and sign the Authorized Security Supervisor Application (application provided at the end of this NTC) and submit it to the CTDOT PM for approval. The Contractor shall also provide a criminal history report for the proposed Authorized Security Supervisor that will be reviewed and approved by the CTDOT PM and Metro-North Railroad (MNRR) security personnel. The report shall be generated by a company such as "ChoicePoint" that has been providing background checks in the industry for a minimum of one year. The Authorized Security Supervisor Application, along with the required criminal history report, shall be submitted to the CTDOT PM for approval at the time of the Project Pre-Construction meeting.

The Contractor shall arrange for the same Security Supervisor to be available throughout the project duration. The Security Supervisor will take responsibility for all badging requirements for the Contractor and all trade contractor employees and shall coordinate these requirements with

MNR and ConnDOT security personnel. Particular tasks required of the Security Supervisor include:

The Security Supervisor shall issue and review all employee applications for security badges (application provided at the end of this NTC). The Security Supervisor shall verify all information supplied by the applicant on the Contractor Security Badge Application in addition to verifying other physical characteristics such as height, weight, and hair/eye color as they appear on the applicant's photo identification. Once employee applications have been verified, the Security Supervisor shall create the badge and issue it to the applicant. The Security Supervisor shall be responsible for determining the duration the badge is required. Badges will be issued for the duration needed based on the approved construction schedule, or for one year, whichever is less. The Security Supervisor must maintain a database of all employees with badges, including application information, duration of badge, and current status of badge (actively being used or has been returned). This must be kept up to date, on a daily basis, and be available for immediate audit by MNR security personnel. The Security Supervisor shall provide all approved Security Badge Applications to MNR security personnel at the end of each day. Approved applications will be reviewed by MNR security personnel who will have the authority to revoke badges should it be determined necessary for any reason.
The badge shall be of plastic type, without smart chip for swipe access, shall be yellow in color and a minimum of 2" by 3" by 30 mils thick in size. The badge shall have a photo of the employee and the following information in this order:

New Haven Rail Yard
Project Name (Coordinate with Engineer)
Photo of Employee
Name of Employee
Contractor / Trade contractors Name
Badge #
Expiration Date
The Statement "Contractor Employee" under the expiration date

The Contractor shall provide a badging unit capable of printing photo ID pictures directly onto a badge of the type and size indicated above. All text shall be a minimum of 1/8-inch high and employee photo shall be a minimum of 1-inch by 1 ¼-inch.

The Contractor shall ensure that all employees wear their badge at all times, and that no employee is permitted to begin work until they are safety trained and have been issued badges. An outline of the photo identification badge procedure is included in this specification.

The Contactor shall be aware that access through the Hallock Avenue entrance will be limited to Contractor employees in passenger vehicles and two axle pick-up trucks only. All deliveries and commercial vehicles are required to enter through the Brewery/Long Wharf Street entrance. Delivery drivers are not required to have a badge, however they are required to sign in on the "Delivery Sign in Sheet" maintained by the MNR security guard on a weekly basis (a sample of the sign in sheet is provided at the end of this NTC). Delivery and employee access times through the Brewery/Long Wharf Street entrance are restricted to Monday – Friday, 6:00 a.m. – 4:00 p.m. unless otherwise requested 24 hours in advance and approved by the CTDOT PM. Access times are not restricted for Contractor employees in passenger vehicles and two axle pick-up trucks entering through the Hallock Avenue entrance unless otherwise directed by the CTDOT PM.

The Contractor shall abide by all Safety Requirements as described in the Notice To Contractor – Work on Railroad Property

The Contractor shall abide by the following MNRR/CDOT Security Requirements:

- Obey all Federal, State, and Local laws and ordinances
- Comply with all traffic rules and regulations while on CDOT property
- Obey all legal direction from MTA Police or other law enforcement organizations having jurisdiction on or about CDOT property and facilities
- Comply with security rules and regulations contained in this contract and subsequent rules and regulations that may be issued from time to time.
- Pertaining to the scope of published security rules and regulations, obey direction from CDOT/MNRR security personnel who have jurisdiction at rail yards and facilities. Security personnel, including guards, have a responsibility to maintain a secure and safe work environment
- Contractors are not authorized to release security sensitive information or confidential information about construction projects without written authorization from the CTDOT PM and MNRR security personnel

The Contractor is hereby notified that no separate pay item or additional time will be granted for badging and other site security requirements. All durations for the activities noted above shall be considered when the Contractor develops a construction schedule. Additional administrative costs for security requirements, including the cost of the badging unit and supplies, shall not be paid for separately but shall be included in the general cost of the work.

New Haven Rail Yard

Photo Identification Security Badge Procedure

This procedure is required to obtain a photo identification security badge for all employees involved in the construction of any of the New Haven Rail Yard – Maintenance Facility Complex Projects.

1. Contractor or trade contractor employees in passenger vehicles and two axle pick-up trucks on the first day shall report to the guard booth at the Hallock Avenue entrance and sign in showing valid identification in the form of a Driver's License or other Government Photo ID. All other Contractor employees shall report to the guard booth at the Brewery/Long Wharf Street entrance.
2. Contractor or trade contractor employee reports to the Contractor's trailer to be processed for a photo identification security badge.
3. Proof of identification is required in the form of:
   Valid U.S. / U.S. Territory / Canadian Driver's License
   Valid Passport
   Valid Government Photo ID
4. Proof of identification will be photocopied and attached to this application.
5. Application form is completed and signed by the employee.
6. Application is reviewed, and approved by, the Contractor's Authorized Security Supervisor.
7. Photo identification security badge is issued to the employee.

8. Photo identification security badge must be presented to the Metro-North Security guard at the Brewery/Long Wharf Street entrance while entering the site and shall be worn with issued breakaway lanyard while on Metro-North property.
9. If the photo identification security badge is lost or stolen it must be immediately reported to the Contractor and a replacement badge will be issued.
10. Photo identification security badge must be surrendered at the end of the work assignment to the Contractor.

NEW HAVEN RAIL YARD
CONTRACTOR SECURITY BADGE APPLICATION

TO BE COMPLETED BY APPLICANT:

CONTRACTOR INFORMATION		
CONTRACTOR NAME	SUPERVISOR NAME	
BUSINESS ADDRESS (Number and Street)		
CITY	STATE	ZIP CODE (Last 4 digits are optional)
AREA CODE ( ) -	PHONE NUMBER	

EMPLOYEE INFORMATION			
EMPLOYEE NAME (Last)	(First)	(MI)	SUFFIX (JR., DR., II)
ADDRESS (Number and Street)			
CITY	STATE	ZIP CODE (Last 4 digits are optional)	
AREA CODE ( ) -	PHONE NUMBER	DATE OF BIRTH (MM/DD/YYYY)	
SIGNATURE	DATE (MM/DD/YYYY)		

TO BE COMPLETED BY AUTHORIZED SECURITY SUPERVISOR:

ACCEPTABLE PHOTO IDENTIFICATION		
☐ VALID U.S. / U.S. TERRITORY / CANADIAN'S DRIVER'S LICENSE ☐ VALID PASSPORT ☐ VALID GOVERNMENT PHOTO ID, SPECIFY _____		
IDENTIFICATION #	STATE ISSUED (IF APPLICABLE)	EXPIRATION DATE
☐ APPROVED		
BADGE # ISSUED	EFFECTIVE DATE (MM/DD/YYYY)	EXPIRATION DATE (MM/DD/YYYY)
☐ DENIED		
REASON		
SIGNATURE OF AUTHORIZED SECURITY SUPERVISOR	DATE (MM/DD/YYYY)	

NEW HAVEN RAIL YARD
AUTHORIZED SECURITY SUPERVISOR APPLICATION
TO BE COMPLETED BY APPLICANT:

CONTRACTOR INFORMATION			
CONTRACTOR NAME	SUPERVISOR NAME		
BUSINESS ADDRESS (Number and Street)			
CITY	STATE	ZIP CODE (Last 4 digits are optional)	
AREA CODE ( ) -	PHONE NUMBER		

EMPLOYEE INFORMATION			
EMPLOYEE NAME (Last)	(First)	(MI)	SUFFIX (JR., DR., II)
ADDRESS (Number and Street)		SOCIAL SECURITY NUMBER - -	
CITY	STATE	ZIP CODE (Last 4 digits are optional)	
AREA CODE ( ) -	PHONE NUMBER	DATE OF BIRTH (MM/DD/YYYY)	
ARE YOU A U.S. CITIZEN? (IF NO, PROVIDE DOCUMENTATION AUTHORIZING YOU TO WORK IN THE U.S.)			
HAVE YOU EVER BEEN CONVICTED OF A FELONY? (IF YES, PLEASE EXPLAIN IN DETAIL)			

BY SIGNING BELOW, I CERTIFY THAT ALL INFORMATION PROVIDED IS TRUE AND CORRECT. PROVIDING FALSE STATEMENTS WILL BE GROUNDS FOR IMMEDIATE TERMINATION. I ALSO ACKNOWLEDGE THAT I MAY BE SUBJECT TO A BACKGROUND CHECK AND AUTHORIZE THE RELEASE OF INFORMATION FOR THAT PURPOSE.	
SIGNATURE	DATE (MM/DD/YYYY)

TO BE COMPLETED BY METRO-NORTH RAILROAD SECURITY DEPARTMENT:

☐ **APPROVED**		
☐ **DENIED**		
REASON		
SIGNATURE OF AUTHORIZED METRO-NORTH SECURITY DEPTARTMENT REPRESENTATIVE		DATE (MM/DD/YYYY)
PRINTED NAME	TITLE	

Delivery Sign-In Sheet – Issued Weekly – Dated __/__/__

Full Name	Company	Photo ID # & Type	Product	Location	Plate # & State	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Guard Name

GG. SECURITY SENSITIVE INFORMATION

The Contractor and Trade Subcontractors shall comply with the requirements of the MTA (Metropolitan Transit Authority) Security Sensitive Handbook Version 3.0 March 15, 2006.

HH. 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 Metro-North Railroad and Shore Line East, operated by Amtrak. The majority of the work is outside the NHRY. 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, maintenance and repair of trains, flagging, inspection, repair, construction, reconstruction, and maintenance of the railroad right-of-way and facilities.

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

There is a need to coordinate demolition and construction work, construction field office locations, vehicular access, contractor parking, Metro-North employee parking, Amtrak employee parking, and material stockpiling and staging areas with the following adjacent and nearby projects within the New Haven Rail Yard:

Fueling Facility (301-0097)
Diesel Storage Yard (301-0110)
Component Change Out Shop (301-0106)
EMU/CSR Shop Improvements (300-0137)
Stores Building Demolition (301-0111)
West End Yard (300-0138)
Yard Power Upgrade (301-0144)

The Contractor’s activities may overlap with activities of other contractors engaged in the execution of the above projects. There is a potential for limitations on track outages and extraordinary requirements for vehicular access coordination. The Contractor shall conduct his work within such limitations. This may require night work, premium time, weekend work, or multiple shifts. The Contractor is fully responsible to complete the contract work.

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

The Contractor shall provide the CTDOT PM with written notification a minimum of 14 days in advance of any work that requires a track or catenary outage or affects existing roadway circulation or parking areas within the New Haven Rail Yard.

The Contractor's employees, and the employees of all trade contractors, who will be entering the jobsite within Railroad territory, must undergo a Railroad safety training class, of approximately one hour, offered by Metro-North Railroad. The CTDOT PM will arrange for the class; however, the Contractor is responsible for ensuring that all employees on the jobsite have been trained. No additional compensation will be allowed to the Contractor for employee's time for attending these classes.

Cooperation with Utilities (Including Railroads): The CTDOT PM may anticipate that a Project construction activity will require the removal, repair, replacement or relocation of a utility appurtenance.

In such an instance, the CTDOT PM, in advance of the commencement of such activity, will notify the affected utilities, either directly or through the local government, of the anticipated nature and timing of said activity. The CTDOT PM will endeavor to have all necessary adjustments of public or private utility fixtures, pipelines, and other appurtenances within or adjacent to the limits of Project construction made as soon as practicable, when such changes are required by the State or local government.

Whenever the CTDOT PM determines that the relocation or adjustment of poles or the overhead plant of public or private utilities or railroad facilities is dependent upon the completion of certain required Contract activities, the Contractor shall complete those activities within a reasonable length of time.

Temporary and permanent changes required by the State or local government in water lines, gas lines, sewer lines, wire lines, service connections, water or gas meter boxes, water or gas valve boxes, light standards, cableways, signals and all other utility (including railroad) appurtenances within the site of the proposed Project construction are to be made by others at no expense to the Contractor, except as otherwise provided for in the project specifications or as noted on the plans.

When the Contractor is required by the CTDOT PM to relocate utility appurtenances, such work will be paid for as extra work unless specific bid items for such work appear in the Contract.

If the Contractor, for its convenience or for any other reason, desires a change in the location of a water line, gas line, sewer line, wire line, service connection, water or gas meter box, valve box, light standard, cableway, signal or any other utility (including railroad) appurtenances, the Contractor shall satisfy the Department that the proposed relocation will not interfere with the Contractor's or other contractors' Project operations or their fulfillment of the requirements of the plans, and that said change will not create an obstruction or hazard to traffic. If the requested change of location is acceptable to the CTDOT PM, the Contractor shall make its own request for such relocation work to the utility companies, pipe owners or other parties likely to be affected by said work. Such relocation work shall be done at the Contractor's sole expense.

The Contractor shall schedule its operations in such a manner as to minimize interference with the operations of the utility companies or local governments in effecting the installation of new facilities, as shown on the plans, or the relocation of their existing facilities. The Contractor shall consider in its bid all permanent and temporary utility appurtenances in their present or relocated positions and any installation of new facilities required for the Project. The Department will not make any additional compensation to the Contractor for delays, inconvenience or damage sustained by the Contractor due to

(i) interference with Project construction caused by the location, condition or operation of utility (including railroad) appurtenances or

(ii) the installation, removal, or relocation of such appurtenances; and the Contractor may not make a claim for any such compensation.

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 is hereby advised that electrical power cables may exist underground, within or adjacent to the project work area.

The Contractor is hereby advised that Metro-North Railroad signal cable may exist within or adjacent to the project work area. The Contractor shall contact Mr. Jay Patel of Metro-North at (203) 786-8204, prior to any below ground excavation to assist in the identification and disposition of these cables. The signal cables are generally direct burial or in conduit, 18-72 inches below grade. Any cables or conduits which conflict with the contract work must be relocated by the Railroad prior to commencement of the work.

Contractor Requirements for Work Affecting the Railroad

The Contractor shall be governed by the General Requirements and Covenants of the Contract with the following additions:

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

Mr. Jay Patel
203-786-8204
Notes:

1. Single-track outages will be considered as requests are submitted.
2. While every effort is made to accommodate the Project needs, 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 Metro-North for delays due to unavailability of track and/or power outages. Further, outages are granted on the basis of what is deemed necessary for construction, not merely for the Contractor's convenience.
3. The hours shown for track outages are not the actual time the tracks will be out of service. Time should be allowed for de-energizing and re-energizing power facilities.
4. Track outages requested and approved at the weekly railroad construction coordination meeting must be completed within the approved time frames. All personnel, materials, and equipment must be in the clear to allow for the safe use of the track by trains or railroad equipment by the end of the shift.
5. Unless otherwise arranged, the Contractor should expect to allow for his clearing of the track during the work shift in the event of a railroad operational emergency.
6. Continuous outages, beyond those depicted in the Contract Drawings for utility installation beneath Track 38 and the Coal Bridge Track, will not be considered. "Continuous" in this context means, in general, an outage beyond one normal work shift.

Temporary at-grade crossings across any tracks, other than those indicated in the Contract Documents, if any, WILL NOT be permitted, unless approved by the CTDOT PM. All vehicles, equipment and materials for demolition, stockpiling, and associated activities shall be delivered from the Brewery/Long Wharf Street Entrance.

Because the Contractor shall and must assume that the wires and rails of the Railroad will be energized at all times, the Contractor shall require all of its employees, trade contractors, and others, to sign a form similar to the following form, and furnish the Railroad with one original copy.

WARNING OF DANGER FROM ELECTRIFIED WIRES AND STRUCTURES
TO ALL PERSONS COMING NEAR ELECTRIFIED WIRES AND STRUCTURES

Notice is hereby given that contact, direct or indirect, with any of the electrified wires or structures of this Company is apt to result in serious injury or death and you are warned to avoid all such contact.

Dated

Job
AFE No.
Title

RECEIPT

I have this day received and carefully read the warning or danger from electrified wires and structures issued by you, which was attached to this receipt.

Signed _____

Occupation _____

Date _____

In the presence of

Witness _____

Job
AFE No.

II. NOTICE TO CONTRACTOR – FENCING

The Contractor is hereby notified that a secure perimeter must be maintained at the New Haven Rail Yard at all times. The Contractor shall coordinate with the CTDOT PM for the installation or resetting of fencing and gates as described in the specifications. A staging plan for all work that disrupts the security fence must be submitted to the CTDOT PM in advance for approval. Fencing must be complete in place at the end of each work day. Under no circumstances will it be allowed to leave breaks in the security fence unattended after normal work hours. The CTDOT PM must be notified in advance any time that fencing cannot be completed by the end of the day. MTA Police will be required to maintain security at the discontinuity in the fence beyond approved outages. The cost of the MTA Police shall be the responsibility of the Contractor.

JJ. NOTICE TO CONTRACTOR –ROADWAY ACCESS WITHIN NEW HAVEN RAIL YARD

The Contractor is hereby advised that maintaining access to all existing railroad tracks, equipment, facilities, and construction sites within the New Haven Rail Yard (NHRY) for railroad and State employees, contractors, emergency vehicles and others is hereby required. Access through the Project area shall be maintained at all times from the Brewery/Long Wharf Street and Hallock Avenue entrances to all other areas of the yard and may require the construction of temporary roadways.

Temporary roadways in the Project area shall be surfaced as specified on the plans or with processed aggregate base sufficient to provide a stable driving surface. No stone ballast or miscellaneous fills shall be used to surface temporary roadways. The Contractor shall be responsible for maintaining temporary roadways in the Project area, including the filling of potholes, re-grading, snow removal and all other maintenance work required to maintain a driving surface suitable for the passage of a typical passenger vehicle. Construction and maintenance of temporary roadways shall be provided at no additional cost to the Department.

The Contractor shall repair any and all damage to the existing NHRY roadway network and associated appurtenances located within and outside of the Project area which result from the Contractor's operations. Repairs shall be made within 24 hours of the occurrence of the damage or as directed by the CTDOT PM. Repairs shall restore roadways to the line and grade existing at the time the Contract was awarded. Construction methods and materials shall be of like kind and quality to that used in the original construction of the roadway network. The Contractor shall make all repairs at no additional cost to the Department.

No existing or temporary roadways shall be reduced in width, relocated, or shut down without first submitting a traffic plan to the CTDOT PM for approval. Also see <u>NOTICE TO CONTRACTOR – WORK ON RAILROAD PROPERTY above</u>.

The Contractor shall bid the Contract accordingly.

KK. NOTICE TO CONTRACTOR – USE OF STATE PROPERTY

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

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

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

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

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

For Staging and Storage Areas

The Contractor must submit all requests for the temporary use of any State property in writing to the CTDOT PM. The following minimum information shall be included with the request(s): a description of the proposed operation or use of the site; a site plan detailing the location of the proposed operation/use, and sedimentation and erosion controls; an area plan detailing ingress and egress to the site and proximity to residential and/or occupied buildings; copies of any required environmental permits; and planned hours of operation. The submittal shall also include photo documentation (minimum of 12 each, 8-inch x 10-inch color photos) showing the preconstruction condition of the site and adjacent property at the site boundaries. If the site is State property outside of the DOT right of way, authorization from other State Agencies will also be required for use of the property or site.

For Use Other than Construction Staging and Storage Areas

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

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

LL. NOTICE TO CONTRACTOR – FLOOD CONTINGENCY PLAN

Construction Operation Plan - During construction, the Contractor is bound by the conditions set forth in paragraph 1 below, addresses the need for the Contractor to maintain a stable work area and to coordinate with the National Oceanic and Atmospheric Administration (N.O.A.A.) weather service for information pertaining to storms. These provisions are fully described under Items 9 and 10 of the "Best Management Practices."

1. **General:** This Section identifies those construction activities and other activities under the Department's control or jurisdiction which may have a negative effect on the environment, including the State's native waters and natural resources; and to prevent or minimize any damage to the environment which might result from such activities, either during or following the completion of any transportation Project.

   The Contractor shall comply with all Project permits and permit applications as though the Contractor were the permittee. If at the time the permit is issued, its contents differ from those outlined in the application, the permit shall govern. Should the permit be issued after the solicitation of bid proposals, and should the permit requirements significantly change the character of the work as described in the proposals, Contract adjustments will be made in accordance with the applicable articles in Section 1.04.

   This Section reinforces those environmental protection requirements which the Contractor is bound to meet under the Contract, or under Federal or State laws or regulations. If the Contractor fails to comply with environmental provisions of the Contract or the law, the Contractor shall be penalized as prescribed in this Section and elsewhere in the Contract.

2. **Compliance with Laws and Regulations:** The Contractor shall conduct its operations in conformance with Federal and State permit requirements concerning water, air and noise pollution, and the disposal of controlled or hazardous materials. Permit requirements include, but are not limited to, those established by Federal regulations administered by the United States Coast Guard, Army Corps of Engineers, or Environmental Protection Agency.

   Appropriate permits shall be required for all activities associated with or incidental to the Contractor's operations, including, but not limited to, those regarding the Project site or adjacent areas, waste and disposal areas, borrow and gravel banks, storage areas, haul roads, access roads, detours, field offices, or any other temporary staging areas. The Contractor shall be responsible for, and hold the State harmless from, any penalties or fines which may be assessed by any authority due to the Contractor's failure to comply with any term of an applicable permit.

   The Department will be responsible for obtaining all environmental permits required for Contract work. Any request by the Contractor for authorization of activities or methods not specifically called for or allowed by the applicable permits issued for the Project must be submitted by the Contractor in writing to the CTDOT PM. Such a request must include a detailed description of the proposed activities or methods, and must include justifications for same, along with supporting documentation, showing that the proposed activity or method will

not create a risk of damage to the environment. If such request is granted by the CTDOT PM, the Department will process an application to the appropriate regulatory agency or agencies for any permit amendment, modification, revision or new permit required for the Contractor to carry out the changed activities or methods in question. The Department does not, however, guarantee that it will be able to obtain the desired permit amendment, modification or revision; and the Department will not be liable for the effects of any inability to do so.

The Contractor will not be entitled to any extension of Contract time as a result of the CTDOT PM 's granting of the Contractor's request. If the amendment, modification, or revision of the permit is not necessary except to make possible the changes requested by the Contractor, then no claim may be made by the Contractor based on the amount of time taken by the Department to review the Contractor's proposal, or to apply for or secure the permit amendment, modification or revision. No such proposed additional activity shall commence, nor shall such a changed method be used, until and unless the CTDOT PM approves in writing the Contractor's request.

In case of a failure by the Contractor to perform pollution control work as required by the CTDOT PM, the CTDOT PM may, after having given the Contractor 24 hours advance written notice of its intention to do so, arrange for said work to be performed by other forces, and will deduct the cost from any monies due or which may become due to the Contractor under the Contract or under any other State contract.

3. Water Pollution Control:

A. In relation to its Project work, the Contractor shall, throughout the duration of the Contract, control and abate siltation, sedimentation and pollution of all waters, including but not limited to underground water systems, inland wetlands, and tidal, coastal, or navigable waters. Construction methods proposed by the Contractor must conform to permit application and permit requirements. The Contractor shall assume responsibility for all obligations and costs incurred as a result of the Contractor's failure to comply with the terms and conditions of such applications or permits.

The Contractor shall obtain any permits and pay any fees required for the performance of Project work which is not in the original Contract and (i) which has been made necessary by a failure of the Contractor to comply with any Contract water pollution control requirement, (ii) which is proposed by the Contractor and accepted by the CTDOT PM, (iii) which is to be performed outside the Project limits, (iv) which will involve or necessitate water-handling activities, including, but not limited to, the removal of material from, deposit of materials into, obstruction of, construction within, alteration or pollution of, any inland wetland, tidal wetland, coastal or navigable water, stream, pond, lake, water supply, other body of water or other regulated area.

B. Provisions of the best management practices may be superseded by specific permits from the DEEP The Contractor shall not make any design change in the Contract work which requires a variance from the requirements of the following items until and unless the Contractor has first submitted a detailed written proposal for such change to the CTDOT PM for review by the Department and for transmittal to and review by the DEEP, and has then received written approval from the Department of the proposed variance.

BEST MANAGEMENT PRACTICES

a. No Project construction shall proceed until (i) the Contractor has submitted in writing to the CTDOT PM its erosion and sedimentation control plans for all Project construction; (ii) the CTDOT PM has given in writing his approval of said plans; and (iii) the Contractor has installed all erosion and sedimentation controls called for by said plans approved by the CTDOT PM. Such plans shall be consistent with the Connecticut Council on Soil & Water Conservation's "Connecticut Guidelines for Soil Erosion and Sediment Control" (which is available from the DEEP) and with the version of the Department's "On Site Mitigation for Construction Activities" which is in effect at the time that Contract bid proposals are solicited.

b. Fueling of equipment or machinery within 25 feet of any wetland or watercourse shall be allowed only with the advance written approval of the CTDOT PM.

c. No Project construction shall proceed unless and until a written proposal of methods to prevent construction debris, paint, spent blast materials, or other materials from entering any wetland or watercourse has been submitted by the Contractor and approved by the CTDOT PM in writing; and until such methods have been implemented as the CTDOT PM directs. Such materials shall be collected and disposed of in accordance with all applicable Federal and State laws and regulations. The CTDOT PM may order the Contractor to cease such activity if, in the opinion of the CTDOT PM, weather conditions threaten to cause the deposit of such materials into a wetland or watercourse.

d. No materials resulting from Project construction activities shall be placed in or allowed to contribute to the degradation of a wetland or watercourse. Disposal of any material shall be in accordance with Federal and State laws and regulations.

e. Fording of streams with equipment shall be prohibited, except as approved by the CTDOT PM. Such equipment travel shall be minimized. When frequent equipment travel on stream banks and beds is necessary, the Contractor shall place washed stone as and where necessary in order to minimize erosion, scour, and turbidity; but the Contractor must not do so in a way that will create a significant grade change in the wetland or watercourse.

f. All off-site disposal locations for material and debris resulting from Project construction shall be submitted in writing to the CTDOT PM in advance of their use, and the CTDOT PM shall determine if they are acceptable. The Contractor shall ensure that such locations are outside of wetlands or watercourses, floodplains and stream channel encroachment lines, unless otherwise approved by local, state, or Federal agencies with jurisdiction over the matter. Copies of such approvals shall be kept at the Project site by the CTDOT PM in the environmental inspection folder. Furthermore, the Contractor shall ensure that material from the Project is not placed within an area that has a better water quality classification than does the area from which it was taken, as indicated by the latest DEEP Water Quality Classifications Maps. Any proposed location for disposal of material within a State right-of-way must also be submitted in advance by the Contractor in writing to the CTDOT PM for subsequent review and approval by the Office of Environmental Planning and the Office of Engineering.

g. A construction-sequencing plan and a water-handling plan, including a contingency plan for flood events, must be submitted by the Contractor in writing to the CTDOT PM, and approved by the CTDOT PM, prior to the commencement of any Project construction in a waterway. Water shall be kept deep enough in the channel to allow for the passage of fish and the continuous flow of the watercourse unless the CTDOT PM directs otherwise. Any revised version of the water-handling plan must be capable of accommodating a two-year storm. Any water-handling system that may be in place longer than 6 months must be designed in accordance with the Department's Drainage Manual.

h. When dewatering is necessary, pumps used for same shall not be allowed to discharge directly into a wetland or watercourse. Prior to any dewatering, the Contractor must submit to the CTDOT PM a written proposal for specific methods and devices to be used for same, and must obtain the CTDOT PM 's written approval of such methods and devices, including, but not limited to, the pumping of water into a temporary sedimentation basin, providing surge protection at the inlet or outlet of pumps, floating the intake of a pump, or any other method for minimizing and retaining the suspended solids. If the CTDOT PM determines that a pumping operation is causing turbidity problems, the Contractor shall halt said operation until a means of controlling the turbidity is submitted by the Contractor in writing to the CTDOT PM, approved in writing by the CTDOT PM and implemented by the Contractor.

i. Work within or adjacent to watercourses shall be conducted during periods of low flow, whenever possible. The CTDOT PM shall remain aware of flow conditions during the conduct of such work, and shall order such work stopped if flow conditions threaten to cause excessive erosion, siltation or turbidity. The Contractor shall make every effort to secure the work site before predicted major storms. A major storm shall be defined as a storm predicted by NOAA Weather Service with warnings of flooding, severe thunderstorms, or similarly severe weather conditions or effects. Unless allowed by a DEEP permit, no materials shall be stored and no staging areas shall be placed below the 100-year elevation. Materials which are buoyant, hazardous, flammable, explosive, soluble, expansive, radioactive, and any other materials that could be injurious to human, animal or plant life in the event of a flood shall not be stored below the 500-year flood level.

j. All temporary fill shall be stabilized to prevent erosion and shall be contained so as to prevent sediment or other particulate matter from entering a wetland or watercourse. All areas affected by temporary fills must be restored to their original contours or as directed by the CTDOT PM, and vegetated. Temporary fill shall be placed and excavation shall occur only as and where necessary for Project construction, as determined by the CTDOT PM.

k. The Contractor shall perform seeding within 7 days of reaching an appropriate grading increment, as determined by the CTDOT PM. If the CTDOT PM directs the Contractor, or if the Contractor intends, that a grading operation will be suspended for a period of 30 or more consecutive days, the Contractor shall, within the first 7 days of that period, accomplish required seeding, or take such other measures to stabilize the soil as may be required by the CTDOT PM.

l. Dumping of oil, chemicals or other deleterious materials on the ground or into a watercourse is forbidden. The Contractor shall provide a means of catching, retaining,

and properly disposing of drained oil, removed oil filters, and other deleterious material. The Contractor shall immediately report all spills of such materials to the CTDOT PM and the DEEP.

m. All application of herbicides or pesticides within 25 feet of any wetland or watercourse is prohibited. All permitted applications of such materials must be done by a Connecticut-licensed applicator. The Contractor shall submit in writing to the CTDOT PM the proposed applicator's name and license number, and must receive the CTDOT PM 's approval of the proposed applicator, before such application may be performed.

C. During spawning seasons and in spawning areas, as defined in the Contract, discharges and construction activities shall be restricted so as not to disturb or inhibit aquatic species indigenous to the waters. If the Contractor wants to make a change in construction operations or scheduling which would affect the use of or necessity for any pollution controls, the Contractor must submit before beginning to implement those changes a written proposal detailing them to the CTDOT PM, and must receive the CTDOT PM 's approval of those changes before beginning to make them. Such submission must include a plan showing what erosion and sedimentation controls above and beyond those called for in the Contract would be necessitated by the proposed change.

D. The Contractor shall inspect erosion and sedimentation controls immediately after each rainfall of at least 0.1 inch and sedimentation control devices in a functional condition, in accordance with the "Connecticut Guidelines for Soil Erosion and Sediment Control," as revised, and the Department's "On Site Mitigation for Construction Activities," as revised. In the event that the Contractor fails to maintain such devices in accordance with such documents, and the Contractor does not correct said failures within 24 hours after receipt of written notice of such failures from the CTDOT PM, the Department may proceed with its own or other forces to remedy such failures. The cost to the Department of curing any such specified failure will be deducted from monies owed to the Contractor under the Contract or under any other State contract.

4. **Air Quality Control:** The Contractor shall exercise every reasonable precaution throughout the duration of the Contract to safeguard the air resources of the State by controlling and abating air pollution in accordance with the DEEP's regulations. These measures shall include the control and abatement of dust, mist, smoke, vapor, gas, aerosol, other particulate matter, odorous substances and any combination thereof arising from Project operations, hauling, storage, or manufacture of materials. The Contractor shall be responsible for obtaining any permits necessary for the operation of its Project equipment including but not limited to crushers, compressors and generators.

5. **Noise Pollution:** The Contractor shall take measures to control the noise caused by its construction operations, including but not limited to noise generated by 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 CTDOT PM. The maximum allowable level of noise at the residence or occupied building nearest to the Project site shall be 90 decibels on the "A" weighted scale (dBA). The Contractor shall halt any Project operation that violates this standard until the Contractor develops and implements a methodology that enables it to conduct its Project operations within the 90-dBA limit.

6. **Protection of Archaeological and Paleontological Remains and Materials:** The Contractor shall be alert to the possibility that, during the prosecution of the Project, significant archaeological or paleontological remains or other such materials may be uncovered. When archaeological or paleontological materials are uncovered, the Contractor shall immediately halt operations in the location of same and shall notify the CTDOT PM of said discovery. The Contractor shall make every effort to preserve archaeological or paleontological materials intact in their original positions, in order to preserve the archaeological or paleontological nature and importance of such materials in relation to one another and to the enclosing soil.

   The CTDOT PM shall have the authority to suspend Project work in the area of such discovery for the purpose of preserving, documenting and recovering the archaeological or paleontological materials. The Contractor shall carry out all instructions of the CTDOT PM for the protection of such materials, including steps to protect the site from vandalism and unauthorized investigations, from accidental damage and from dangers such as heavy rainfall or runoff. The Contractor shall reschedule its work to minimize any loss of the time needed to complete the Project while the State evaluates, records and salvages the archaeological or paleontological materials.

   Extra work ordered by the CTDOT PM in this connection will be paid for in accordance with Articles 1.04.05 and 1.09.04. Delays caused by archaeological or paleontological preservation and protection, which the Contractor demonstrates have delayed completion of the Project, will be treated under the provisions for extension of time, Article 1.08.08.

7. **Controlled and Hazardous Materials:** The Department will acquire any "Hazardous Waste Generator Permit(s)" required under the Resource Conservation and Recovery Act, for the management and disposal of hazardous materials on the Project site, provided that:

   A. Such material is within the construction limits defined in the Contract,

   B. Such material is not comprised of waste materials generated by the Contractor.

   If the Department has designated in the Contract, an area of known or suspected contamination within the Project limits, the Contractor shall dispose of such material in accordance with the relevant project specifications.

   In the event that the Contractor encounters or exposes any material, not previously known or suspected to be contaminated, but which exhibits properties that may indicate the presence of controlled or hazardous material, the Contractor shall cease all operations in the material's vicinity, and shall immediately notify the CTDOT PM of the material's discovery. The presence of barrels, discolored earth, metal, wood, visible fumes or smoke, abnormal odors or excessively hot earth may indicate the presence of controlled or hazardous material, and shall be treated with extreme caution.

   If controlled or hazardous materials, other than those required for Contract operations, are discovered at the Project site, the Department may engage a specialty contractor to handle and dispose of the materials. When the Contractor performs support work incidental to the removal, treatment or disposal of controlled or hazardous material, the Department will pay for same at the applicable Contract unit prices. When the Contract does not include appropriate pay items, payment will be made in accordance with Article 1.04.05. The Contractor shall observe all security precautions established pursuant to 29 CFR 1910.120 and 1926.65, including all revisions and amendments thereof, and shall not work in any

area known to contain or suspected of containing controlled or hazardous material without prior written approval from the CTDOT PM.

The Contractor shall assume sole responsibility for the proper storage, handling, management, and disposal of all regulated materials and wastes associated with its operations, including, but not limited to, lubricants, antifreeze, engine fluids, paints, and solvents. All costs associated with any failure by the Contractor to properly manage such materials in accordance with Federal and State regulations, and all remedial and punitive costs incurred by the Department as a result of such failure shall be borne by the Contractor.

This article does not apply to coatings removed by the Contractor.

8. **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).

(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 to sensitive receptors. No work will proceed until a sequence of construction and a Vehicle Emissions Mitigation plan is submitted in writing to the CTDOT PM r for review and all comments are addressed in a manner acceptable to the CTDOT PM. 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".

The Contractor is advised that portions of the rail yard and project area fall within the 100-year and 500-year flood zone. Storage of materials that could be injurious to human health or the environment in the event of flooding will be located outside of the 100-year flood zone. Other material or equipment may be stored below the 500 year flood elevation such that the material or equipment is not subject to major damage by floods, and that such material or equipment will be firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

MM. NOTICE TO CONTRACTOR - CONSTRUCTION OVER EXISTING TWIN BOX CULVERT

Contractor is hereby advised that an existing twin box culvert is located beneath Brewery Street.

The means and methods by which the Contractor chooses to construct the Project shall include provisions to ensure the culverts will not be damaged by the installation of piles, by the application of construction loads, or by any other construction activity which may occur during the Project. Work Plans submitted by the Contractor as required by the Specifications shall include details of the provisions and measures to be used to prevent damage to the culverts.

The Contractor shall limit loads on the culverts as follows:

Where existing grade is maintained, no load greater than an AASHTO HS-20 loading shall be driven over or placed above the existing culverts. For equipment loads greater than this, the Contractor shall provide bridging, cribbing or other methods to reduce the loading per square foot to less than the specified maximum loading. The Contractor shall submit plans, details and structural calculations, sealed by a Professional Structural Engineer licensed in the State of Connecticut, certifying that the equipment loading will not exceed the specified maximum loading.

When the culverts are exposed, no loads from vehicles, equipment or materials shall be imposed on the culverts. If the Contractor deems it necessary to move vehicles and equipment over the exposed culverts, the Contractor shall provide structural bridging to prevent imposing loads. The Contractor shall submit details of proposed bridging for review and approval.

Submittals shall be made in accordance with Section 01 33 00 "Submittal Procedures" and Section 01 33 00.13 "Document Control".

The Contractor shall schedule its work and bid the Project accordingly.

Refer to the items for "Trench Excavation" for requirements pertaining to exposing and locating the existing twin box culverts.

NN. NOTICE TO CONTRACTOR – REUSE OF STOCKPILED MATERIAL

The Trade Contractor is hereby notified that there is stockpiled material available for their use and shall be used where granular fill is specified for use on the project.

The material stockpile is located at a Reuse Stockpile Area (RSA) nearby to the project work area. The RSA is located adjacent to the intersection of Sargent Drive and Brewery Street in the city of New Haven, CT. The material is excess from the construction of the Q bridge project that is under construction. The management, operation, and maintenance of the RSA is the responsibility of the Department and may be contacted at:

State of Connecticut Department of Transportation
District 3A Field Office
Project Engineer (203) 785-8082

When material is used from the RSA, the Trade Contractor shall coordinate and cooperate with the Department or their designee that is responsible for maintaining the stockpile. The Trade Contractor shall be responsible for hauling the material to the project work area as well as complying with applicable erosion control and vehicular regulations. The Trade Contractor shall place the stockpiled material as directed and in accordance with section 31 23 23 Fill.

OO. NOTICE TO CONTRACTOR – MARKINGS FOR UNDERGROUND FACILITIES

In conformance with Section 16-345 through 16-359 of the Regulations of the PURA, the Contractor is responsible for notifying "Call Before You Dig" prior to commencing any excavation, including milling, reclamation or trenching; and the Contractor shall install a warning tape located a minimum of 12 inches above all conduits, wires, cables, utility pipes, drainage pipes, underdrains, or other facility, unless the excavation's depth, other underground facilities, or other engineering considerations make this minimum separation unfeasible. The warning tape shall be of durable impervious material, designed to withstand extended underground exposure without material deterioration or fading of color. The tape shall be of the color assigned to the type of facility for surface markings and shall be durably imprinted with an appropriate warning message. The tape shall also comply with the specific requirements of the utility that owns the facility.

All tapes, unless otherwise directed by the specific utility, shall be detectable to a depth of at least 3 feet with a commercial radio-type metal locator.

Assigned colors are:

Green - Storm and sanitary sewers and drainage systems, including force mains and other nonhazardousmaterials

Blue - Water

Orange - Communication lines or cables, including, but not limited to, those used in, or in connection with, telephone, telegraph, fire signals, cable television, civil defense, data systems, electronic controls and other instrumentation

Red - Electrical power lines, electrical power conduits and other electrical power facilities, traffic signals and appurtenances and illumination facilities

Yellow - Gas, oil petroleum products, steam, compressed air, compressed gases and all other hazardous material except water

Brown - Other

Purple - Radioactive materials

The Trade Contractor is hereby notified that Call Before You Dig will not mark out utilities except for natural gas within the New Haven Rail Yard security perimeter fencing. Most of the work for the MOW project is located outside of the New Haven Rail Yard security perimeter fence and the Trade Contractor may have to describe and specify to Call Before You Dig that locations of work areas are outside of the New Haven Rail Yard perimeter security fencing.

PP. NOTICE TO CONTRACTOR - CAMPAIGN CONTRIBUTION AND SOLICITATION BAN

With regard to a State contract as defined in P.A. 07-1 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 the bid proposal form in response to the State's solicitation expressly acknowledges receipt of the State Elections Enforcement Commission's notice advising prospective state contractors of state campaign contribution and solicitation prohibitions, and will inform its principals of the contents of the notice. The attached SEEC Form 11 is also made a part of this solicitation.

For all State contracts as defined in P.A. 07-1 having a value in a calendar year of $50,000 or more or a combination or series of such agreements or contracts having a value of $100,000 or more, the authorized signatory to this Contract expressly acknowledges receipt of the State Elections Enforcement Commission's notice advising state contractors of state campaign contribution and solicitation prohibitions, and will inform its principals of the contents of the notice. The attached SEEC Form 11 is also made a part of this Contract.

SEEC FORM 11

NOTICE TO EXECUTIVE BRANCH STATE CONTRACTORS AND PROSPECTIVE STATE CONTRACTORS OF CAMPAIGN CONTRIBUTION AND SOLICITATION BAN

This notice is provided under the authority of Connecticut General Statutes 9-612(g)(2), as amended by P.A. 07-1, and is for the purpose of informing State Contractors and prospective State Contractors of the following law (italicized words are defined below):

Campaign Contribution and Solicitation Ban

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, or *solicit* contributions 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; In addition, no holder or principal of a holder of a valid prequalification certificate, shall make a contribution to, or solicit contributions on behalf of (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.

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--$2000 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 $2000 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 $5000 in fines, or both.

Contract Consequences

Contributions made or solicited in violation of the above prohibitions may result, in the case of a State Contractor, in the contract being voided. Contributions made or solicited in violation of the above prohibitions, in the case of a prospective State Contractor, 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 will 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 and the entire text of P.A 07-1 may be found on the website of the State Elections Enforcement Commission, www.ct.gov/seec. Click on the link to “State Contractor Contribution Ban.”

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 section4a-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 or a loan to an individual for other than commercial purposes.

"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.

QQ. NOTICE TO CONTRACTOR - CODE OF ETHICS

The Contractor shall comply with the provisions contained in Section 1-86e of the Connecticut General Statutes, which provides as follows:

A No person hired by the state as a Contractor or independent contractor shall:

1 Use the authority provided to the person under the contract, or any confidential information acquired in the performance of the contract, to obtain financial gain for the person, an employee of the person or a member of the immediate family of any such person or employee;
2 Accept another state contract which would impair the independent judgment of the person in the performance of the existing contract; or
3 Accept anything of value based on an understanding that the actions of the person on behalf of the state would be influenced.

B No person shall give anything of value to a person hired by the state as a Contractor or independent contractor based on an understanding that the actions of the Contractor or independent contractor on behalf of the state would be influenced.

The following clause is applicable to those contracts with a value of five hundred thousand dollars ($500,000) or more**:**

The Contractor shall comply with the Code of Ethics for Public Officials, Conn. Gen. Stat. §§ 1-79 et seq., and Code of Ethics for Lobbyists, Conn. Gen. Stat. §§1-91 et seq., when and where applicable. Insofar as state contractors are concerned, a summary of the most relevant provisions of the Codes of Ethics is contained in the Summary of State Ethics Laws for Current and Potential State Contractors. The Contractor acknowledges receiving such Summary, which is incorporated

herein by reference. The Summary may change from time to time and may be accessed via the Internet at www. ethics.state.ct.us.

The Contractor agrees that the above clause will also be incorporated in all of its contracts with its trade contractors and consultants.

The Contractor agrees that any instance of its violating the Code of Ethics or the Department of Transportation Ethics Policy will be sufficient cause for the Department to terminate any or all of the Contractor's pending contracts with the Department.

In addition, the Contractor hereby acknowledges and agrees to comply with the policies enumerated in "Connecticut Department of Transportation Policy Statement Policy No. F&A-10, Subject: Code of Ethics Policy", dated June 1, 2007, a copy of which is attached hereto and made a part hereof.

CONNECTICUT DEPARTMENT OF TRANSPORTATION

POLICY STATEMENT

POLICY NO. F&A-10
June 1, 2007

SUBJECT: Code of Ethics Policy

The purpose of this policy is to establish and maintain high standards of honesty, integrity, and quality of performance for all employees of the Department of Transportation ("DOT" or "Department"). Individuals in government service have positions of significant trust and responsibility that require them to adhere to the highest ethical standards. Standards that might be acceptable in other public or private organizations are not necessarily acceptable for the DOT.

It is expected that all DOT employees will comply with this policy as well as the Code of Ethics for Public Officials, and strive to avoid even the appearance of impropriety in their relationships with members of the public, other agencies, private vendors, consultants, and contractors. This policy is, as is permitted by law, in some cases stricter than the Code of Ethics for Public Officials. Where that is true, employees are required to comply with the more stringent DOT policy.

The Code of Ethics for Public Officials is State law and governs the conduct of all State employees and public officials regardless of the agency in which they serve. The entire Code, as well as a summary of its provisions, may be found at the Office of State Ethics' web site: www.ct.gov/ethics/site/default.asp. For formal and informal interpretations of the Code of Ethics, DOT employees should contact the Office of State Ethics or the DOT's Ethics Compliance Officer or her designee.

All State agencies are required by law to have an ethics policy statement. Additionally, all State agencies are required by law to have an Ethics Liaison or Ethics Compliance Officer. The DOT, because of the size and scope of its procurement activities, has an Ethics Compliance Officer who is responsible for the Department's: development of ethics policies; coordination of ethics training programs; and monitoring of programs for agency compliance with its ethics policies and the Code of Ethics for Public Officials. At least annually, the Ethics Compliance Officer shall provide ethics training to agency personnel involved in contractor selection, evaluation, and supervision. A DOT employee who has a question or is unsure about the provisions of this policy, or who would like assistance contacting the Office of State Ethics, should contact the Ethics Compliance Officer or her designee.

The DOT Ethics Compliance Officer is:

Denise Rodosevich, Managing Attorney
Office of Legal Services

For questions, contact the Ethics Compliance Officer's Designee:

Alice M. Sexton, Principal Attorney
Office of Legal Services
2800 Berlin Turnpike
Newington, CT 06131-7546
Tel. (860) 594-3045

To contact the Office of State Ethics:

Office of State Ethics
20 Trinity Street, Suite 205
Hartford, CT 06106
Tel. (860) 566-4472
Facs. (860) 566-3806
Web: www.ethics.state.ct.us

Enforcement

The Department expects that all employees will comply with all laws and policies regarding ethical conduct. Violations of the law may subject an employee to sanctions from agencies or authorities outside the DOT. Whether or not another agency or authority imposes such sanctions, the Department retains the independent right to review and respond to any ethics violation or alleged ethics violation by its employees. Violations of this policy or ethics statutes, as construed by the DOT, may result in disciplinary action up to and including dismissal from State service.

Prohibited Activities

1. ***Gifts:*** DOT employees (and in some cases their family members) are prohibited by the Code of Ethics and this Policy from accepting a gift from anyone who is: (1) doing business with, or seeking to do business with, the DOT; (2) directly regulated by the DOT; (3) prequalified as a contractor pursuant to Conn. Gen. Stat. §4a-100 by the Commissioner of the Department of Administrative Services (DAS); or (4) known to be a registered lobbyist or a lobbyist's representative. These four categories of people/entities are referred to as "restricted donors." A list of registered lobbyists can be found on the web site of the Office of State Ethics (www.ct.gov/ethics/site/default.asp). A list of prequalified consultants and contractors, *i.e.,* those seeking to do business with the DOT, can be found on the DOT's Internet site under "Consultant Information" and "Doing Business with ConnDOT," respectively.

   The term "gift" is defined in the Code of Ethics for Public Officials, Conn. Gen. Stat. §1-79(e), and has numerous exceptions. For example, one exception permits the acceptance of food and/or beverages valued up to $50 per calendar year from any one donor and consumed on an occasion or occasions while the person paying or his representative is present. Therefore, such food and/or beverage is not a "gift." Another exception permits the acceptance of items having a value up to ten dollars ($10) provided the aggregate value of all things provided by the donor to the recipient during a calendar year does not exceed fifty dollars ($50). Therefore, such items are not a "gift." Depending on the circumstances, the "donor" may be an individual if the individual is bearing the expense, or a donor may be the individual's employer/group if the individual is passing the expense back to the employer/group he/she represents.

   This policy requires DOT employees to immediately return any gift (as defined in the Code of Ethics) that any person or entity attempts to give to the employee(s). If any such gift or other item of value is received by other than personal delivery from the subject person or entity, the item shall be taken to the Office of Human Resources along with the name and address of the person or entity who gave the item. The Office of Human Resources, along with the recipient of the item of value, will arrange for the donation of the item to a local charity (e.g., Foodshare, local soup kitchens, etc.). The Office of Human Resources will then send a letter to the gift's donor advising the person of the item's donation to charity and requesting that no such gifts be given to DOT employees in the future.

2. ***Contracting for Goods or Services for Personal Use With Department Contractors, Consultants, or Vendors:*** Executive Order 7C provides that: "Appointed officials and state employees in the Executive Branch are prohibited from contracting for goods and services, for personal use, with any person doing business with or seeking business with his or her agency, unless the goods or services are readily available to the general public for the price which the official or state employee paid or would pay."

3. ***Gift Exchanges Between Subordinates and Supervisors/Senior Staff:*** A recent change in the Code of Ethics prohibits exchanges of gifts valued at $100 or more between (*i.e.*, to and from) supervisors and employees under their supervision. The Citizen's Ethics Advisory Board has advised that: (1) the monetary limit imposed by this provision is a per-gift amount; (2) gifts given between supervisors and subordinates (or *vice versa)* in celebration of a "major life event," as defined in the Code of Ethics, need not comply with the $100 limit; and (3) the limitations imposed by this provision apply to a direct supervisor and subordinate *and to any individual up or down the chain of command.* The Citizen's Ethics Advisory Board has also advised that supervisors or subordinates may not pool their money to give a collective or group gift valued at $100 or more, even though each of the individual contributions is less than $100.

4. ***Acceptance of Gifts to the State:*** A recent change to the Code of Ethics for Public Officials modified the definition of the term "gift" to limit the application of the so-called "gift to the State" exception. In general, "gifts to the State" are goods or services given to a State agency for use on State property or to support an event and which facilitate State action or functions. Before accepting any benefit as a "gift to the State," DOT employees should contact the Ethics Compliance Officer.

5. ***Charitable Organizations and Events:*** No DOT employee shall knowingly accept any gift, discount, or other item of monetary value for the benefit of a charitable organization from any person or entity seeking official action from, doing or seeking business with, or conducting activities regulated by, the Department.

6. ***Use of Office/Position for Financial Gain:*** DOT employees shall not use their public office, position, or influence from holding their State office/position, nor any information gained in the course of their State duties, for private financial gain (or the prevention of financial loss) for themselves, any family member, any member of their household, nor any "business with which they are associated." In general, a business with which one is associated includes any entity of which a DOT employee or his/her immediate family member is a director, owner, limited or general partner, beneficiary of a trust, holder of 5 percent or more stock, or an officer (president, treasurer, or executive or senior vice president).

   DOT employees shall not use or distribute State information (except as permitted by the Freedom of Information Act), nor use State time, personnel, equipment, or materials, for other than State business purposes.

7. ***Other Employment:*** DOT employees shall not engage in, nor accept, other employment that will either impair their independence of judgment with regard to their State duties or require or induce them to disclose confidential information gained through their State duties.

   Any DOT employee who engages in or accepts other employment (including as an independent contractor), or has direct ownership in an outside business or sole proprietorship, shall complete an Employment/Outside Business Disclosure Form (see attached) and submit it to the Department's Human Resources Administrator. Disclosure of other employment to the DOT Human Resources Administrator shall *not* constitute approval of the other employment for purposes of the Code of Ethics for Public Officials.

   Inquiries concerning the propriety of a DOT employee's other employment shall be directed to the Office of State Ethics to assure compliance with the Code of Ethics for Public Officials. Employees anticipating accepting other employment as described above should give ample time (at least one month) to the Office of State Ethics to respond to such outside employment inquiries.

No employee of the DOT shall allow any private obligation of employment or enterprise to take precedence over his/her responsibility to the Department.

8. ***Outside Business Interests:*** Any DOT employee who holds, directly or indirectly, a financial interest in any business, firm, or enterprise shall complete an Employment/Outside Business Disclosure Form (see attached) and submit it to the Department's Human Resources Administrator. An indirect financial interest includes situations where a DOT employee's spouse has a financial interest in a business, firm, or enterprise. A financial interest means that the employee or his spouse is an owner, member, partner, or shareholder in a non-publicly traded entity. Disclosure of such outside business interests to the DOT Human Resources Administrator shall *not* constitute approval of the outside business interest under this Policy or the Code of Ethics for Public Officials. DOT employees shall not have a financial interest in any business, firm, or enterprise which will either impair their independence of judgment with regard to their State duties or require or induce them to disclose confidential information gained through their State duties. Inquiries concerning the propriety of a DOT employee's outside business interests shall be directed to the Office of State Ethics to assure compliance with the Code of Ethics for Public Officials.

9. ***Contracts With the State***: DOT employees, their immediate family members, and/or a business with which a DOT employee is associated, may not enter into a contract with the State, other than pursuant to a court appointment, valued at $100 or more unless the contract has been awarded through an open and public process.

10. ***Sanctioning Another Person's Ethics Violation***: No DOT official or employee shall counsel, authorize, or otherwise sanction action that violates any provision of the Code of Ethics.

11. ***Certain Persons Have an Obligation to Report Ethics Violations:*** If the DOT Commissioner, Deputy Commissioner, or "person in charge of State agency procurement" and contracting has reasonable cause to believe that a person has violated the Code of Ethics or any law or regulation concerning ethics in State contracting, he/she *must* report such belief to the Office of State Ethics. All DOT employees are encouraged to disclose waste, fraud, abuse, and corruption about which they become aware to the appropriate authority (see also Policy Statement EX.O.-23 dated March 31, 2004), including, but not limited to, their immediate supervisor or a superior of their immediate supervisor, the DOT Office of Management Services, the Ethics Compliance Officer, the Auditors of Public Accounts, the Office of the Attorney General, or the Office of the Chief State's Attorney.

12. ***Post-State Employment Restrictions:*** In addition to the above-stated policies of the Department, DOT employees are advised that the Code of Ethics for Public Officials bars certain conduct by State employees ***after they leave State service. Upon leaving State service:***

    - ***Confidential Information***: DOT employees must never disclose or use confidential information gained in State service for the financial benefit of any person.

    - ***Prohibited Representation***: DOT employees must *never* represent anyone (other than the State) concerning any "particular matter" in which they participated personally and substantially while in State service and in which the State has a substantial interest.

    DOT employees also must not, for one year after leaving State service, represent anyone other than the State for compensation before the DOT concerning a matter in which the State has a substantial interest. In this context, the term "represent" has been very broadly defined. Therefore, any former DOT employee contemplating post-State employment work that might involve interaction with any bureau of DOT (or any Board or Commission administratively under the DOT) within

their first year after leaving State employment should contact the DOT Ethics Compliance Officer and/or the Office of State Ethics.

- ***Employment With State Vendors:*** DOT employees who participated substantially in, or supervised, the negotiation or award of a State contract valued at $50,000 or more must not accept employment with a party to the contract (other than the State) for a period of one year after resigning from State service, if the resignation occurs within one year after the contract was signed.

13. ***Ethical Considerations Concerning Bidding and State Contracts:*** DOT employees also should be aware of various provisions of Part IV of the Code of Ethics that affect any person or firm who: (1) is, or is seeking to be, prequalified by DAS under Conn. Gen. Stat. §4a-100; (2) is a party to a large State construction or procurement contract, or seeking to enter into such a contract, with a State agency; or (3) is a party to a consultant services contract, or seeking to enter into such a contract, with a State agency. These persons or firms shall not:

    - With the intent to obtain a competitive advantage over other bidders, solicit any information from an employee or official that the contractor knows is not and will not be available to other bidders for a large State construction or procurement contract that the contractor is seeking;

    - Intentionally, willfully, or with reckless disregard for the truth, charge a State agency for work not performed or goods not provided, including submitting meritless change orders in bad faith with the sole intention of increasing the contract price, as well as falsifying invoices or bills or charging unreasonable and unsubstantiated rates for services or goods to a State agency; and

    - Intentionally or willfully violate or attempt to circumvent State competitive bidding and ethics laws.

    Firms or persons that violate the above provisions may be deemed a nonresponsible bidder by the DOT.

    In addition, no person with whom a State agency has contracted to provide consulting services to plan specifications for any contract, and no business with which such person is associated, may serve as a consultant to any person seeking to obtain such contract, serve as a contractor for such contract, or serve as a subcontractor or consultant to the person awarded such contract.

    DOT employees who believe that a contractor or consultant may be in violation of any of these provisions should bring it to the attention of their manager.

Training for DOT Employees

A copy of this policy will be posted throughout the Department, and provided to each employee either in hard copy or by e-mail. As set forth above, State law requires that certain employees involved in contractor/consultant/vendor selection, evaluation, or supervision must undergo annual ethics training coordinated or provided by the Ethics Compliance Officer. If you believe your duties meet these criteria, you should notify your Bureau Chief to facilitate compilation of a training schedule. In addition, the DOT Ethics Compliance Officer can arrange for periodic ethics training provided by the Office of State Ethics. Finally, the Department will make available, on its web site or otherwise, a copy of this policy to all vendors, contractors, and other business entities doing business with the Department.

Important Ethics Reference Materials

It is strongly recommended that every DOT employee read and review the following:

- Code of Ethics for Public Officials, Chapter 10, Part 1, Conn. General Statutes Sections 1-79 through 1-89a found at: www.ct.gov/ethics/site/default.asp

- Ethics Regulations Sections 1-81-14 through 1-81-38, found at: www.ct.gov/ethics/site/default.asp

- The Office of State Ethics web site includes summaries and the full text of formal ethics advisory opinions interpreting the Code of Ethics, as well as summaries of previous enforcement actions: www.ct.gov/ethics/site/default.asp. DOT employees are strongly encouraged to contact the Department's Ethics Compliance Officer or her designee, or the Office of State Ethics with any questions or concerns they may have.

(This Policy Statement supersedes Policy Statement No. F&A-10 dated January 6, 2006)

R. J. Carpenter

Ralph J. Carpenter
COMMISSIONER

Attachment

List 1 and List 3
(Managers and supervisors are requested to distribute a copy of this Policy Statement to all employees under their supervision.)

cc: Office of the Governor, Department of Administrative Services, Office of State Ethics

Emp&discForm 5/07

Department of Transportation
Employment & Outside Business
Disclosure Form

In accordance with Department of Transportation (Department) Policy Statement No. F&A-10, Code of Ethics Policy, I am hereby advising the Department that in addition to my current DOT position, I have other employment and/or a direct or indirect financial interest in an outside business as follows:

1. Full name of outside employer, or entity in which I or my spouse have a financial interest (e.g., ownership or member/partner):

_____

2. Location of Employer/Entity disclosed above: _____

3. Nature of my/my spouse's relationship to employer/entity disclosed above (check at least one):

   _____ Employee or Independent Contractor (circle one)
   _____ Owner/Member/Partner/etc.
   _____ Family Member of Owner/Member/Partner/etc.

4. State agency(ies) with which above employer/entity is doing business or seeking Business (write "N/A" if not applicable): _____

5. Job Title at Outside Employer: _____

6. Job Responsibilities at Outside Employer: _____

_____

_____

7. Current State Title: _____

8. Current State Job Responsibilities: _____

_____

_____

9. Name/Title of Current State Supervisor: _____

I understand that the filing of this Disclosure with the DOT Human Resources Administrator does not relieve me of any obligations I have to comply with the Code of Ethics for Public Officials, and does not constitute approval of my outside employment and/or financial interests under the Code of Ethics for Public Officials. *Employees engaging in outside employment are strongly urged to seek written approval of their outside employment from the Office of State Ethics, 20 Trinity Street, Hartford, CT 06106.* I also understand that if either my State or outside employment/financial interest changes in location or function I am required to notify the Department immediately.

Signed: _____ Date: _____
Printed Name: _____

RR. NOTICE TO CONTRACTOR - GIFT CERTIFICATION DISCLOSURE

Pursuant to Connecticut General Statutes, Section 4-252 and Executive Order No. 7C, paragraph 10, the Contractor is notified of subsections (c) and (d) of this Section as follows. The Contractor must incorporate the planning date indicated below under subsection (e) on Certification Form 1, at the time the Contract is executed.

(c) The official of the person, firm or corporation awarded the contract, who is authorized to execute the contract, shall certify on such form as the State shall provide the following:

(1) That no gifts were made between the date that the state agency or quasi-public agency began planning the project, services, procurement, lease or licensing arrangement covered by the contract and the date of execution of the contract, by (A) such person, firm, corporation, (B) any principals and key personnel of the person, firm or corporation, who participated substantially in preparing the bid or proposal or the negotiation of the contract, or (C) any agent of such person, firm, corporation or principals and key personnel, who participated substantially in preparing the bid or proposal or the negotiation of the contract, to (i) any public official or state employee of the state agency or quasi-public agency soliciting bids or proposals for the contract, who participated substantially in the preparation of the bid solicitation or request for proposals for the contract or negotiation or award of the contract, or (ii) any public official or state employee of any other state agency, who has supervisory or appointing authority over such state agency or quasi-public agency;

(2) That no such principals and key personnel of the person, firm or corporation, or agent of such person, firm or corporation or principals and key personnel, knows of any action by the person, firm or corporation to circumvent such prohibition on gifts by providing for any other principals and key personnel, official, employee or agent of the person, firm or corporation to provide a gift to any such public official or state employee; and

(3) That the person, firm or corporation made the bid or proposal without fraud or collusion with any person.

(d) Any bidder or proposer that does not make the certifications required under subsection (c) of this section shall be disqualified and the state agency or quasi-public agency shall award the contract to the next highest ranked proposer or the next lowest responsible qualified bidder or seek new bids or proposals.

(e) The date that the Department of Transportation began planning the project, services, procurement, lease or licensing arrangement to be covered by this contract is April 19, 2010.

SS. NOTICE TO CONTRACTOR – CAMPAIGN CONTRIBUTION CERTIFICATION

A certification of campaign contribution to accompany State Contracts with a value of $50,000 or more in a calendar or fiscal year, pursuant to Conn. Gen. Stat. §4-250 and Executive Orders No. I, paragraph 8 and No. 7C, paragraph 10, must be completed on the form provided by the Department of Transportation (DOT); and such certification shall cover the two year period preceding the execution of the contract. Each principal of a joint venture, if any, must submit a separate certification. The Department of Transportation will not accept a bid for a large state construction or procurement contract without such certification.

TT. NOTICE TO CONTRACTOR - AFFIDAVIT REGARDING CONSULTING AGREEMENTS

The "Affidavit Regarding Consulting Agreements" must be completed and should be submitted in response to such a request for procurement or solicitation for those contracts having an anticipated total value to the State of more than fifty thousand dollars ($50,000) in a calendar or fiscal year. Contractors will not be selected if the required Affidavit is not submitted.

This Affidavit is attached to all bid proposals when issued to prospective bidders. Bidders are responsible for the submission of this Affidavit.

UU. NOTICE TO CONTRACTOR - ETHICS SUMMARY

The current “Acknowledgment of Receipt of Summary of State Ethics Laws” must be completed by you and should be submitted with your bid for any large state construction or procurement contract as defined in Section 32 of Public Act 05-287. The Department of Transportation will not accept a bid for a large state construction or procurement contract without such Acknowledgment.

In addition, if you are awarded such a contract, you will be required to obtain from your sub-contractors and consultants a fully and properly executed copy of the attached “Trade contractor and/or Consultant Acknowledgment of Receipt of Summary of State Ethics Laws,” and to submit said copies to the initiating unit.

1.11 SMALL CONTRACTOR AND SMALL CONTRACTOR MINORITY BUSINESS ENTERPRISES

March, 2001

NOTE: Certain of the requirements and procedures stated in this "Special Provision" are applicable prior to the execution of the Contract.

A. GENERAL

1. The Contractor shall cooperate with the Connecticut Department of Transportation (CONNDOT or CTDOT) in implementing the required contract obligations concerning "Small Contractor" and "Small Contractor Minority Business Enterprise" use on this Contract in accordance with Section 4a-60g of the Connecticut General Statutes as revised. References, throughout this "Special Provision", to "Small Contractors" are also implied references to "Small Contractor Minority Business Enterprises" as both relate to Section IIA of these provisions. The Contractor shall also cooperate with CONNDOT in reviewing the Contractor's activities relating to this provision. This "Special Provision" is in addition to all other equal opportunity employment requirements of this Contract.

2. For the purpose of this "Special Provision", the "Small Contractor(s)" and "Minority Business Enterprise(s)" named to satisfy the set-aside requirement must be certified by the Department of Administrative Services, Business Connections/ Set-Aside Unit [(860) 713-5236 www.das.state.ct.us/busopp.htm] as a "Small Contractor" and "Minority Business Enterprises" as defined by Section 4a-60g Subsections (1) and (3) of the Connecticut General Statutes as revised and is subject to approval by CONNDOT to do the work for which it is nominated pursuant to the criteria stipulated in Section IIC-3.

3. Contractors who allow work which they have designated for "Small Contractor" participation in the pre-award submission required under Section IIC to be performed by other than the approved "Small Contractor" organization and prior to concurrence by CONNDOT, will not be paid for the value of the work performed by organizations other than the "Small Contractor" designated.

4. If the Contractor is unable to achieve the specified contract goals for "Small Contractor" participation, the Contractor shall submit written documentation to CONNDOT's Manager of Construction Operations indicating his/her good faith efforts to satisfy goal requirements. Documentation is to include but not be limited to the following:

    a. A detailed statement of the efforts made to select additional trade contract opportunities for work to be performed by each "Small Contractor" in order to increase the likelihood of achieving the stated goal.

    b. A detailed statement, including documentation of the efforts made to contact and solicit contracts with each "Small Contractor", including the names, addresses, dates and telephone numbers of each "Small Contractor" contacted, and a description of the information provided to each "Small Contractor" regarding the scope of services and anticipated time schedule of items proposed to be trade contracted and the nature of response from firms contacted.

c. For each "Small Contractor" that placed a trade contract quotation which the Contractor considered not to be acceptable, provide a detailed statement of the reasons for this conclusion.

d. Documents to support contacts made with CONNDOT requesting assistance in satisfying the contract specified or adjusted "Small Contractor" dollar requirements.

e. Document other special efforts undertaken by the Contractor to meet the defined goal.

1. Failure of the Contractor to have at least the specified dollar amount of this contract performed by "Small Contractor" as required in Section IIA of this "Special Provision" will result in the reduction in contract payment to the Contractor by an amount equivalent to that determined by subtracting from the specific dollar amount required in Section IIA, the dollar payments for the work actually performed by each "Small Contractor". The deficiency in "Small Contractor" achievement, will therefore, be deducted from the final contract payment. However, in instances where the Contractor can adequately document or substantiate its good faith efforts made to meet the specified or adjusted dollar amount to the satisfaction of CONNDOT, no reduction in payments will be imposed.

2. All records must be retained for a period of three (3) years following completion of the contract and shall be available at reasonable times and places for inspection by authorized representatives of CONNDOT.

3. Nothing contained herein, is intended to relieve any contractor or trade contractor or material supplier or manufacturer from compliance with all applicable Federal and State legislation or provisions concerning equal employment opportunity, affirmative action, nondiscrimination and related subjects during the term of this Contract.

B. SPECIFIC REQUIREMENTS

1. In order to increase the participation of "Small Contractors", CONNDOT requires the following:

   Not less than twelve percent_(12%) of the **final** value of this Contract shall be trade contracted to and performed by, and/or supplied by, manufactured by and paid to "Small Contractors" and/or "Small Contractors Minority Business Enterprises".

   If the above percentage is zero (0%) AND an asterisk (*) has been entered in the adjacent brackets [ ], this Contract is 100% solely set-aside for participation by "Small Contractors" and/or "Small Contractors Minority Business Enterprises".

2. The Contractor shall assure that each "Small Contractor" will have an equitable opportunity to compete under this "Special Provision", particularly by arranging solicitations, time for the preparation of Quotes, Scope of Work, and Delivery Schedules so as to facilitate the participation of each "Small Contractor".

3. The Contractor shall provide to CONNDOT's Manager of Contracts within Seven (7) days after the bid opening the following items:

   a. An affidavit (Exhibit I) completed by each named "Small Contractor" trade contractor listing a description of the work and indicating the dollar amount of all contract(s)

and/or trade contract(s) that have been awarded to him/her for the current State Fiscal Year (July 1 - June 30) does not exceed the Fiscal Year limit of $10,000,000.00.

b. A certification of work to be trade contracted (Exhibit II) signed by both the Contractor and the "Small Contractor" listing the work items and the dollar value of the items that the nominated "Small Contractor" is to perform on the project to achieve the minimum percentage indicated in Section IIA above.

c. A certification of past experience (Exhibit III) indicating the scope of work the nominated "Small Contractor" has performed on all projects, public and private, for the past two (2) years.

d. In instances where a change from the originally approved named "Small Contractor" (see Section IB) is proposed, the Contractor is required to submit, in a reasonable and expeditious manner, a revised submission, comprised of the documentation required in Section IIC, Paragraphs 1, 2 and 3 and Section E together with documentation to substantiate and justify the change, (i.e., documentation to provide a basis for the change) to CONNDOT's Manager of Construction Operations for its review and approval prior to the implementation of the change. The Contractor must demonstrate that the originally named "Small Contractor" is unable to perform in conformity to specifications, or unwilling to perform, or is in default of its contract, or is overextended on other jobs. The Contractor's ability to negotiate a more advantageous contract with another "Small Contractor" is not a valid basis for change. Documentation shall include a letter of release from the originally named "Small Contractor" indicating the reason(s) for the release.

4. After the Contractor signs the Contract, the Contractor will be required to meet with CONNDOT's Manager of Construction Operations or his/her designee to review the following:

   a. What is expected with respect to the "Small Contractor" set aside requirements.

   b. Failure to comply with and meet the requirement can and will result in monetary deductions from payment.

   c. Each quarter after the start of the "Small Contractor" the Contractor shall submit a report to CONNDOT's Manager of Construction Operations indicating the work done by, and the dollars paid to each "Small Contractor" to date.

   d. What is required when a request to sublet to a "Small Contractor" is submitted.

5. The Contractor shall submit to CONNDOT's Manager of Construction Operations all requests for trade contractor approvals on standard forms provided by the Department.

   If the request for approval is for a "Small Contractor" trade contractor for the purpose of meeting the contract required "Small Contractor" percentage stipulated in Section IIA, a copy of the legal contract between the Contractor and the "Small Contractor" trade contractor must also be submitted at the same time. Any subsequent amendments or modifications of the contract between the Contractor and the "Small Contractor" trade contractor must also be submitted to CONNDOT's Manager of Construction Operations

with an explanation of the change(s). The contract must show items of work to be performed, unit prices and, if a partial item, the work involved by both parties.

In addition, the following documents are to be attached:

a. A statement explaining any method or arrangement for renting equipment. If rental is from a Contractor, a copy of Rental Agreement must be submitted.

b. A statement addressing any special arrangements for manpower.

c. A statement addressing who will purchase material.

6. Contractors trade contracting with a "Small Contractor" to perform work or services as required by this "Special Provision" shall not terminate such firms without advising CONNDOT, in writing, and providing adequate documentation to substantiate the reasons for termination if the designated "Small Contractor" firm has not started or completed the work or the services for which it has been contracted to perform.

7. Material Suppliers or Manufacturers

If the Contractor elects to utilize a "Small Contractor" supplier or manufacturer to satisfy a portion or all of the specified dollar requirements, the Contractor must provide the Department with:

a. An executed Affidavit Small Contractor (Set-Aside) Connecticut Department of Transportation Affidavit Supplier or Manufacturer (sample attached), and

b. Substantiation of payments made to the supplier or manufacturer for materials used on the project.

Brokers and packagers shall not be regarded as material Suppliers or manufacturer.

8. Non-Manufacturing or Non-Supplier "Small Contractor" Credit

Contractors may count towards its "Small Contractor" goals the following expenditures with "Small Contractor" firms that are not manufacturers or suppliers:

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

b. The fees charged for delivery of materials and supplies required on a job site (but not the cost of the materials and supplies themselves) when the hauler, trucker, or delivery service is not also the manufacturer of or a regular dealer in the materials and supplies, provided that the fee is determined by the Department of Transportation to be reasonable and not excessive as compared with fees customarily allowed for similar services.

c. The fees or commissions charged for providing any bonds or insurance specifically required for the performance of the Contract, provided that the fee or commission is determined by the Department of Transportation to be reasonable and not excessive as compared with fees customarily allowed for similar services.

9. BROKERING

For the purpose of this "Special Provision", a "Broker" is one who acts as an agent for others in negotiating contracts, purchases, sales, etc., in return for a fee or commission. Brokering of work by a "Small Contractor" is not allowed and is a contract violation.

10. PRE-AWARD WAIVERS

If the Contractor's submission of the "Small Contractor" listing, as required by Section IIC indicates that it is unable, by trade contracting to obtain commitments which at least equal the amount required by Section IIA, it may request, in writing, a waiver of up to 50% of the amount required by Section IIA. To obtain such a waiver, the Contractor must submit a completed "Application for Waiver of Small Contractor Minority Business Enterprise Goals" to CONNDOT's Manager of Contracts which must also contain the following documentation:

A. Information described in Section ID.

B. For each "Small Contractor" contacted but unavailable, a statement from each "Small Contractor" confirming its unavailability.

Upon receipt of the submission requesting a waiver, the CONNDOT's Manager of Contracts shall submit the documentation to the Director of the Office of Contract Compliance who shall review it for completeness. After completion of the Director of Contract Compliance's review, she/he should write a narrative of his/her findings of the application for a waiver, which is to include his/her recommendation. The Director of Contract Compliance shall submit the written narrative to the Chairperson of the DBE Screening Committee at least five (5) working days before the scheduled meeting. The Contractor shall be invited to attend the meeting and present his/her position. The DBE Screening Committee shall render a decision on the waiver request within five (5) working days after the meeting. The DBE Screening Committee's decision shall be final. Waiver applications are available from the CONNDOT Manager of Contracts.

EXHIBIT I Mar. 01

SMALL CONTRACTOR/*MINORITY BUSINESS ENTERPRISE
(* Delete if not Applicable)
SET-ASIDE PROGRAM
(QUALIFICATION AFFIDAVIT)

PROJECT(s) _____
(INCLUDING TOWN & DESCRIPTION)

STATE OF _____CONNECTICUT_____

COUNTY OF_____

I_____,ACTING IN BEHALF
NAME OF PARTY SIGNING AFFIDAVIT
OF_____,DO HEREBY CERTIFY
PERSON FIRM OR ORGANIZATION
AND AFFIRM THAT THE INFORMATION SET FORTH BELOW IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE. AS OF THIS DATE_____THE LIST OF SMALL CONTRACTOR SET-ASIDE PROGRAM - CONTRACTS AND/OR SUBCONTRACTS AWARDED DURING THE CURRENT FISCAL YEAR (JULY 1 - JUNE 30) 20_____ IS AS FOLLOWS:

Col. 1 TOWN AND PROJECT NUMBER	Col. 2 STATE AGENCY WHICH AWARDED CONTRACT	Col. 3 CONTRACT AMOUNT AWARDED UNDER THIS PROGRAM	Col. 4 AMOUNT OF WORK SUBCONTRACTED FROM OTHER FIRMS UNDER THIS PROGRAM	Col. 5 TOTAL AMOUNT OF ALL WORK UNDER THIS PROGRAM Col. 3 Plus Col. 4
	TOTALS	$	$	$

_____
NAME OF PERSON, FIRM OR ORGANIZATION

(FIRM SEAL)

_____
SIGNATURE & TITLE OF OFFICIAL

SWORN TO AND SUBSCRIBED BEFORE ME BY_____

WHO IS PERSONALLY KNOWN TO ME, THIS_____DAY OF_____, 20_____

_____
(NOTARY PUBLIC)

MY COMMISSION EXPIRES_____SEAL

PLEASE NOTE THAT ALL THE WORK AWARDED OR SUBCONTRACTED TO YOUR FIRM UNDER THE SET-ASIDE PROGRAM IN A FISCAL YEAR (JULY 1-JUNE 30) INCLUDING THIS PROJECT, CANNOT BE MORE THAN $10,000,000.00

Mar.01

EXHIBIT II

CERTIFICATION OF WORK TO BE SUBCONTRACTED
NOMINATED SMALL CONTRACTOR/*MINORITY BUSINESS ENTERPRISE

* Delete if not applicable

DEPARTMENT OF TRANSPORTATION
CONTRACT DIVISION
2800 BERLIN TURNPIKE
NEWINGTON, CT 06111

PLEASE INCLUDE A COPY OF CERTIFICATION LETTER

CONTRACTOR_____

ADDRESS_____

TOWN_____PROJECT NO._____

DESCRIPTION OF PROJECT_____

_____

CONTRACT BID AMOUNT $_____

DATE_____

Listed below is the Nominated Small Contractor/Minority Business Enterprise for the above project and the requested data:

Name, Address & Tel No. of the Nominated Firm	ITEM(s)NUMBER(s) and Description of the Item(s) to be performed by and paid to the Subcontractor	Quantities (indicate if partial)	Prime's Bid Amount For Item	Dollar Amount Subcontracted	Small Business Set-Aside Dollar Requirement

Signed By _____
Small Contractor/*Minority Business Enterprise
(Subcontractor)

Signed By_____
Contractor

Title_____

Mar.01

EXHIBIT III

CERTIFICATION
PAST CONSTRUCTION EXPERIENCE

SMALL CONTRACTOR / * MINORITY BUSINESS ENTERPRISES

* Delete if not applicable

PLEASE LIST ALL CONSTRUCTION PROJECTS YOUR ORGANIZATION HAS WORKED ON IN THE PAST TWO FISCAL YEARS

PROJECT LOCATION NUMBER AND DESCRIPTION APPLICABLE	CONTRACT AMOUNT	IF WORK PERFORMED AS PRIME GIVE OWNERS NAME IF WORK PERFORMED AS SUBCONTRACTOR GIVE CONTRACTORS NAME	START DATE	ACTUAL OR ESTIMATED COMPLETION DATE	NAME AND PHONE OF OWNER OR PRIME CONTRACTOR AS

SIGNED BY: _____
SMALL BUSINESS CONTRACTOR
*MINORITY BUSINESS ENTERPRISES

D.O.T. PROJECT NO. _____

* Delete if not applicable

MARCH, 2001

SMALL CONTRACTOR/SMALL CONTRACTOR MINORITY BUSINESS ENTERPRISE (MBE) (SET-ASIDE) CONNECTICUT DEPARTMENT OF TRANSPORTATION AFFIDAVIT – SUPPLIER OR MANUFACTURER

This affidavit must be completed by the State Contractor's designated Small Contractor/ Small Contractor Minority Business Enterprise (MBE), notarized and attached to the contractor's request to utilize a Small Contractor/Small Contractor Minority Business Enterprise (MBE) supplier or manufacturer as a credit towards its Small Contractor/Small Contractor Minority Business Enterprise (MBE) contract requirement; failure to do so will result in not receiving credit towards the contract Small Contractor/Small Contractor Minority Business Enterprise (MBE) requirement.

State Project No. _____
Federal Aid Project No. _____
Description of Project _____

I, _____, acting in behalf of _____
(Name of person signing Affidavit) (Small Contractor/Small Contractor MBE contractor person,
_____ of which I am the_____ affirm that _____
firm, association or certify and corporation) (Title of Person) (Small
_____is a certified Small Contractor/Small
Contractor/Small Contractor MBE person, firm, association or corporation)
Contractor Minority Business Enterprise, as defined by Section 4a-60g of the Connecticut General Statutes, as revised.

I further certify and affirm that _____
(Small Contractor/Small Contractor MBE person, firm, association or corporation)
will assume the actual and contractual responsibility for the provision of the materials and/or supplies sought by _____. If a manufacturer, I produce goods from raw
(State Contractor)
materials or substantially alter them before resale, or if a supplier, I perform a commercially useful function in the supply process.

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

_____
(Name of Small Contractor/Small Contractor MBE person, firm, association or corporation)

_____
(Signature and Title of Official making the Affidavit)

Subscribed and sworn to before me, the _____ day of _____ 200____.

_____
Notary Public (Commissioner of the Superior Court)

My Commission Expires _____

CERTIFICATE OF CORPORATION

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

_____

(Signature of Person Certifying) (Date)

(Corporate Seal)

1.12 CLAIMS

A. GENERAL

When filing a formal claim under Section 4-61 (referred to as "Section 4-61" below) of the Connecticut General Statutes (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.

B. 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.

C. 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.

D. CLAIM COMPENSATION

The payment of any claim, or any portion thereof, that is deemed valid by the CTDOT PM shall be made in accordance with the following provisions of this Article:

1. 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, see Section 01 26 00 Contract Modification Procedures.)

a. Additional Project-site labor expenses.

b. Additional costs for materials.

c. Additional, unabsorbed Project-site overhead (**e.g.**, for mobilization and demobilization).

d. Additional costs for active equipment.

e. 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 Sub-articles (1) through (4) above; except that if the delay or suspension period prevented the Contractor from incurring enough Project costs under Sub-articles (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.

f. 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.

g. Trade contractor costs limited to, and determined in accordance with, Subarticles (1), (2), (3), (4), and (5) above and applicable statutory and case law. Such trade contractor 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 trade contractor costs.

2. Non-Compensable Items:

The Department will have no liability for the following specifically-identified non-compensable items:

a. Profit, in excess of that provided for herein.

b. Loss of anticipated profit.

c. Loss of bidding opportunities.

d. Reduction of bidding capacity.

e. Home office overhead in excess of that provided for in Section D. Claim Compensation, part 1e.

f. Attorney's fees, claims preparation expenses, or other costs of claims proceedings or resolution.

g. 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.

E. REQUIRED CLAIM DOCUMENTATION:

All claims shall be submitted in writing to the Commissioner, and shall be sufficient in detail to enable the CTDOT PM 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 detailed factual statement of the claim, with all dates, locations and items of work pertinent to the claim.

1. 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.

2. Excerpts from manuals or other texts which are standard in the industry, if available, that support the Contractor's claim.

3. The details of the circumstances that gave rise to the claim.

4. 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.

5. Specific identification of any pertinent document, and detailed description of the substance of any material oral communication, relating to the substance of such claim.

6. 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.

7. 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:

a. That supporting data is accurate and complete to the Contractors best knowledge and belief;

b. That the amount of the dispute and the dispute itself accurately reflects what the Contractor in good faith believes to be the Departments liability;

c. The certification shall be executed by:

   i. If the Contractor is an individual, the certification shall be executed by that individual.

   ii. 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.

F. 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 trade contractors and suppliers shall cooperate fully with the Department's auditors. Failure of the Contractor**,** its trade contractors, 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. Trade contractor invoices to the Contractor, and the Contractor's certificates of payments to trade contractors.
13. Trade contractor 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 trade contractors' 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 trade contractor'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 Section 1.12 Claims.
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.

1.13 PROSECUTION AND PROGRESS

A. Transfer of Work or Contract:

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

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

1. The trade contractor has fulfilled the contract requirements of both the Department and the trade contract for the trade contracted work, including the completion of any specified material and equipment testing requirement or plant establishment period and the submission of all submittals (i.e.: certified payrolls, material samples and certifications, required state and federal submissions, etc.) required by the specifications and the Department, and

2. The work done by the trade contractor has been inspected and approved by the Department and the final quantities of the trade contractor's work have been determined and agreed upon.

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

The CTDOT PM will institute administrative procedures to expedite the determination of final quantities for the trade contractor’s satisfactorily completed work.

The inspection and approval of a trade contractor's work does not eliminate the Contractor's responsibilities for all the work as defined in Section 1.10 “Miscellaneous Provisions” Part E “Construction Responsibility

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

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

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

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

B. Prosecution of Work:

The Project staging and sequence of construction is depicted in a series of plan drawings titled "Construction Staging". No change to the Project staging will be allowed without prior approval of the CTDOT PM.

The Contractor is advised that portions of the Contract work are dependent on the Contractor's work activities being completed to allow the follow-on work by MNRR (Refer to "Notice To Contractor – Metro-North Railroad Coordination") below. Additionally, certain portions of the Contractor's work can not start until MNRR completes its work. The Contractor must be specifically aware of the following dependencies with MNRR.

1. MNRR communications line(s) are nearby to the site. Until such time as notified by the CTDOT PM, the Contractor must protect the communications line(s) from construction activities.
2. A MNRR medium voltage electric duct bank is nearby to the site. Until such time as notified by the CTDOT PM, The Contractor must locate and protect the electric duct bank from construction activities and pile driving.
3. Final connections to in-service security and communications networks will be performed by MNRR forces.

The existing Rail Yard is protected by a perimeter security fence. The Contractor is advised that a secure Rail Yard perimeter must be maintained at all times. Any work activities that have the potential to compromise the secure perimeter or require modifications to or relocations of security fencing must be authorized in advance by the CTDOT PM.

C. Limitation of Operations

"Refer to "Section 1.7 "Contractor Use of Premises" for additional limitations."

The Contractor is advised that the installation of gas lines in the project must be coordinated with the Southern Connecticut Gas Company (SCG). The Contractor will excavate the trench install and compact bedding materials upon which SCG will install and connect the gas lines. Thereafter, the Contractor will backfill the trench to the final elevation.

The Contractor is advised that during the installation of production piles, a minimum of two (2) pile driving crews may be used for a minimum of ten (10) hours per day, six (6) days per week. In addition, there shall be no pile driving during any scheduled performances at Long Wharf Theatre, 222 Sargent Drive, New Haven, CT. The theatre's year-round schedule of performances shall consist of night shows five days per week starting at 7:00 pm and lasting for two hours, plus an average of two matinee shows per week starting at 2:00 pm and lasting for two hours.

The Contractor is advised that continuity of Rail Yard operations and street traffic on adjacent local streets must be maintained throughout construction. In addition, the operation of railroad and public utilities on and adjacent to the site must not be compromised.

The Contractor is advised that treated water from dewatering activities must be discharged to the 8" force main connecting to railyard dewatering plant.

1.14 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.

1.16 CONTROL OF THE WORK

A. Special Requirements Regarding Work in Metro-North territory:

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

Metro-North Commuter Railroad Company – Permission to Enter Upon Railroad Property
Permission is hereby granted to the Contractor to enter property of the State of Connecticut, under the custody and control of the Connecticut Department of Transportation (hereinafter called "ConnDOT") and managed by Metro-North Commuter Railroad Company (hereinafter called "Railroad"), a public benefit corporation and subsidiary of Metropolitan Transportation Authority (hereinafter called "MTA"). The purpose of this permission shall be solely for the purposes outlined in this Contract and under the following terms and conditions:

a. Location and Access. Permission is hereby granted to the Contractor and its trade contractor(s), if any, to enter the property within the Project Limits identified on the Contract Plans (hereinafter called the "Property").

b. Liability. The Contractor covenants and agrees to at all times indemnify, protect and save harmless MTA, Railroad, National Railroad Passenger Corporation ("AMTRAK"), Housatonic Railroad Company ("Housatonic"), Providence & Worcester Railroad Company ("P&W"), and ConnDOT from and against any and all losses, damages, detriments, suits, claims, demands, costs, and charges which MTA, Railroad, AMTRAK, Housatonic, P&W, or ConnDOT may directly or indirectly suffer, sustain, or be subjected to by or on account of Contractors entry upon, occupancy or use of the Property, or the conduct thereon of the Contractor, its trade contractors, officers, employees, agents or invitees, whether such loss or damage be suffered or sustained by MTA, Railroad, AMTRAK, Housatonic, P&W or ConnDOT directly or persons (including employees of MTA, Railroad or ConnDOT or Corporations who may seek to hold MTA, Railroad, AMTRAK, Housatonic, P&W or ConnDOT liable therefore), and whether attributable to the fault, failure or negligence of MTA, Railroad, AMTRAK, Housatonic, P&W or ConnDOT or otherwise.

c. Consideration. The Contractor will pay to the Railroad, the sum of Zero Dollars ($0.00) for the right to enter upon the Property.

d. Terms of Permit. The Railroad reserves the right to revoke this permission at any time. Unless subsequently modified, this shall begin with notice to proceed and shall end at

Contract completion at which time it shall expire automatically. Under no circumstances shall this temporary permission be construed as granting the Contractor any rights, title or interest of any kind or character in, on, or about the land or premises of MTA or Railroad thereafter. The Permittee agrees to notify the Railroad when use of the Property or work is completed.

B. DEFINITIONS:

Railroad - Whenever the term "Railroad" is used without further qualification, it shall be taken to mean Metro-North Railroad.

On or Adjacent to - shall be interpreted to include space on, above and below railroad right-of-way operated by Metro-North, as well as space on, above, and below adjacent property which Metro-North determines to affect the safe operations of railroad service.

The Safety Rules - All work shall be performed in accordance with rules, regulations, procedures, and safe practices on the Railroad, FRA, OSHA, NESC and all other government agencies having jurisdiction over this Project.

Authority of the Engineer - All Contract work upon or affecting railroad property, right-of-way or facilities, shall also be subject to the approval of the Chief Engineer, Maintenance of Way of the Railroad or its duly authorized representative, through coordination with the Engineer.

Coordination of Work - The Contractor shall be responsible for the coordination of the work of its trade contractors with respect to the railroad property, right-of-way or facilities.

Track - The space between the rails plus not less than 4-ft outside each rail.

Horizontal Clearance Point - A point 10-ft from the centerline of a track.

Vertical Clearance Point - A point 22’-6” above the top of a running rail unless otherwise authorized by Metro-North.

Traffic Envelope - The area encompassed by the vertical and the horizontal clearance points.

Obstruction - An entering of the traffic envelope, also referred to as fouling.

Occupancy - Any use of track other than direct crossing.

Right-of-Way - The limits of railroad property on either side of tracks.

Use of Track - Obtaining permission from the proper authority at Metro-North for track occupancy.

Conductor/Flagman - A Metro-North employee qualified on the Rules of the Operating Department and qualified on the physical characteristics of the portion of the railroad involved. They are the contact employee qualified to obtain the use of track. Each conductor/flagman will have the proper flagging equipment, up-to-date Metro-North Operating Rules, Metro-North Timetables and Metro-North Safety Rules.

Groundman - Class “A” employee of Metro-North’s Power Department authorized to de-energize/re-energize and ground high-tension power lines.

Qualified Metro-North Employee - For the purpose of these instructions, a qualified employee is a Metro-North employee qualified to remove track or tracks from service.

REQUIREMENTS FOR PERFORMING WORK ON OR ADJACENT TO THE RIGHT OF WAY OF THE RAILROAD

A. General

1. The Contractor should note that the proposed work involves construction operations on or adjacent to property owned by ConnDOT and operated by Metro-North Railroad. In working near an operating Railroad, great care must be exercised and the Railroad's safety rules must be strictly observed.

2. If while completing the work covered by this Contract, the tracks or other facilities of the Railroad are endangered, the Contractor shall immediately do such work as directed by the Railroad through the CTDOT PM to restore safety. Upon failure of the Contractor to carry out such orders immediately, the Railroad may take whatever steps as are necessary to restore safe conditions. The cost and expense to the Railroad of restoring safe conditions, or of any damage to the Railroad's trains, tracks or other facilities caused by the Contractor's or trade contractor's operations, shall be considered a charge against the Contractor and shall be paid for by him, or may be deducted from any monies due or that may become due him under this Contract.

B. Rules and Regulations

1. Railroad traffic shall be maintained at all times, and the Contractor shall conduct all of its operations on or adjacent to the Railroad right-of-way fully within the rules, regulations, and requirements of the Railroad. The Contractor shall be responsible for acquainting himself with such requirements as the Railroad may demand. The Contractor shall include in its bid any expenses occasioned by delay or interruption of its work by reason of the operation or maintenance of the Railroad facilities.

2. The Contractor shall obtain verification of the time and schedule of track occupancy from the Railroad before proceeding with any construction or demolition work on or adjacent to the Railroad right-of-way.

3. All work to be done on or adjacent to the Railroad right-of-way shall be performed by the Contractor in a manner satisfactory to the Railroad and shall be performed at such times and in such manner as not to interfere with the movement of trains or traffic upon the tracks of the Railroad. The Contractor shall use all necessary care to avoid accidents, damage, delay or interference with the Railroad's trains or property.

4. If deemed necessary by the Railroad, it may furnish or assign an inspector who will be placed on the work during the time the Contractor or any trade contractor is performing work under the Contract on Railroad property.

5. Before proceeding with any construction of demolition work on or adjacent to the Railroad's property, a pre-construction meeting shall be held at which time the Contractor shall submit for approval of the Railroad, Plans, computations, and a detailed description of its method of procedure for accomplishing the specific construction work required under this Contract, including methods of protecting Railroad traffic. Such approval shall not serve in any way

to relieve the Contractor of its complete responsibility for the adequacy and safety of its methods of procedures.

6. The Contractor shall conduct its work and handle its equipment and materials so that no part of any equipment shall foul an operated track or wire line without the written permission of the Railroad.

7. Equipment shall be considered to be potentially fouling the track when located in such a position that failure of same with or without load brings the equipment within the traffic envelope. No equipment shall be placed in this position without prior approval of the Railroad.

8. Equipment of the Contractor to be used:

a. Equipment of the Contractor to be used adjacent to the tracks shall be in first-class condition so as to fully prevent failures of defective equipment that might cause delay in the operations of trains or damage to Railroad facilities. Its equipment shall not be placed or put into operation adjacent to tracks without first obtaining permission from the Railroad. Under no circumstances shall any equipment or materials be placed or stored within 25-ft from the near rail of a track in operation, unless approved in advance by the Metro-North representative.

b. High rail equipment of the Contractor to be used on the tracks shall be subject to prior approval of the Railroad. The equipment must be inspected and approved in advance at Metro-North's facility by Metro-North inspectors.

c. On track vehicles shall be equipped with a MNRR approved tow bar and coupler. Multiple vehicles shall move in tandem and coupled when directed by Metro-North. Movement of on track vehicles shall proceed only under the direct supervision of a qualified MNRR employee.

d. Materials and equipment belonging to the Contractor shall not be stored on Railroad property without first having obtained permission from the CTDOT PM and Railroad, and such permission will be on the condition that the CTDOT PM and Railroad will not be liable for damage to such materials and equipment from any cause. The Contractor shall keep the tracks adjacent to the site clear of all refuse and debris that may accumulate from its operations and shall leave the Railroad property in the condition existing before the start of its operations.

e. The Contractor shall coordinate with the CTDOT PM and the Railroad in order to determine the type of protection required to insure safety and continuity of Railroad traffic incident to the particular methods of operation and equipment to be used on the work.

f. The Railroad will require protection during all periods when the Contractor is working on, or over, the right-of-way of the Railroad, or as may be found necessary in the opinion of the Railroad. When protection is required, refer to Paragraph 1.7.

g. It shall be expressly understood that this Contract includes no work for which the Railroad is to be billed by the Contractor, and it shall be further understood that the Contractor is not to bill the Railroad for any work which he may perform, unless the Railroad gives a written request that such work be performed at its expense.

h. Upon completion of the work, and before final payment is made, the Contractor shall remove from within the limits of the Railroad's right-of-way, all machinery, equipment, surplus materials, falsework, rubbish and temporary buildings, and other property of the Contractor/sub-contractor, and shall leave the right-of-way in a condition satisfactory to the Railroad.

9. Railroad Protective Services: Railroad protective services will be provided in accordance with the Roadway Worker's Protective Act, Title 49, Part 214, Sub-part C. Railroad protective services will also be performed to insure safe operations of trains when construction work would, in the Railroad's opinion, be a hazard to Railroad operations.

10. Definition of Hazard: Metro-North has furnished the statements quoted below explaining when they consider a hazard to operations exists.

"Protective services will be required whenever the Contractor is performing work on or adjacent to the Railroad tracks or right-of-way, such as excavating, sheeting, shoring, erection and removal of forms, handling materials, using equipment which by swinging or by failure could foul the track, and when any other type of work being performed, in the opinion of the Railroad, requires such service."

11. Contractor Requirements for Work Affecting the Railroad

a. All matters requiring Railroad Company approval or coordination shall be directed to the CTDOT PM or a duly authorized representative thereof, for forwarding to Metro-North Railroad.

b. Detailed plans and appurtenant data and calculations for any operation which, in the opinion of Metro-North, affect the Railroad, must be submitted to the CTDOT PM or a duly authorized representative thereof, for forwarding to Metro-North Railroad for approval prior to commencement of the work. A Connecticut registered Professional CTDOT PM must stamp all plans and calculations submitted.

c. Permissible Track Outages: Permissible Track Outages are identified in the NOTICE TO CONTRACTOR – WORK ON RAILROAD PROPERTY contained within the Provisions of the Contract. The times identified are the times that the track can be removed from service. If power outages are required, the grounding of the wires will subtract approximately 30 minutes from the outage time.

d. The Contractor shall maintain a minimum of 12-in level shoulder from ends of ties to maintain lateral track support for all excavations and shall not excavate any slope steeper than 1 (vertical) on 2 (horizontal) from the edge of the shoulder. Sheeting shall be required on all excavations where the side of the excavation is intercepted by the Railroad live load influence line. The live load influence line is defined as a line originating at the bottom edge of tie and extending downward at a slope of 1 (vertical) on 1½ (horizontal). Such excavations must be designed to withstand, in addition to all common loads such as soil pressure and hydrostatic pressure, a railroad live load of Cooper E-80.

e. The Contractor shall be required to design and install protective scaffolding over the right-of-way where, at the sole discretion of the Railroad, such scaffolding is necessary to protect the Railroad from possible falling debris; paint or other materials; to protect personnel working about the right-of-way or to provide a platform for personnel, materials and/or equipment. Said scaffolding shall be designed for live load of 200

lbs./sq. ft applied uniformly over the entire structure and a 2 kips concentrated load placed anywhere on the structure. The two loads are not to be applied simultaneously for design purposes.

f. All excavation areas within or near interlocking limits shall be located by the Contractor and inspected by Metro-North Railroad for the purpose of determining conflicts with underground facilities.

g. Exploratory trenches, 36-in deep and 15-in wide in the form of an "H" with outside dimensions matching and outside of sheeting dimensions are to be hand dug, in areas where railroad underground installations are known to exist. These trenches are for exploratory purposes only and are to be backfilled and compacted immediately. All work outlined above must be done in the presence of a Railroad inspector.

h. Cavities adjacent to sheet piling, created by driving of sheet piling, shall be filled with sand and any distributed ballast must be restored and tampered immediately.

i. Sheet piling shall be cut off at top of tie during construction and at 36-in below bottom of tie after construction just prior to completion of back filling.

j. Plans and calculations for sheeting and scaffolding must be submitted to the CTDOT PM for forwarding to the Railroad for approval prior to construction. A Connecticut registered Professional Engineer must stamp plans and calculations.

12. Requirements for Erection, Demolition and Other Rigging Operations On or Adjacent to Railroad Right-of-Way: The Contractor shall be required to furnish the following information to the CTDOT PM or a duly authorized representative thereof, for forwarding to Metro-North Railroad for their approval prior to the start of any rigging operation over or adjacent to the Railroad right-or-way:

a. Plan view showing locations of cranes, boom length and rigging operating radii, with delivery or disposal locations shown.

b. Crane rating sheets showing crane(s) to be adequate for 150% of the lift. Crane and boom nomenclature is to be indicated.

c. Plans and computations showing weight of pick.

d. Location plan showing obstructions, indicating that the proposed swing is possible.

e. Plans showing locations and details of mats, planking or special decking as may be required by the Railroad.

f. Written statement from crane owner giving date of last crane condition and safety inspection and the results of said inspection.

g. Data sheet listing number, type, size and arrangement of slings, spreader bars or other connecting equipment. Include copies of catalog or information sheets of specialized equipment. All such equipment shall be shown adequate to safely carry 150% of the calculated loading.

h. A complete procedure is to be included, indicating the order of lifts and repositioning or re-hitching of the crane or cranes.

i. Temporary support of any components or intermediate stages is to be shown.

j. A time schedule of the various stages must be shown, as well as a schedule for the entire lifting procedure.

k. A Connecticut licensed Professional Engineer must stamp all erection, demolition and rigging plans and calculations submitted to the Railroad.

l. Operations directly on or adjacent to the operating right-of-way will be performed only at times and under conditions specified by the Railroad's representative.

13. Ordering Protective Personnel: Metro-North will furnish protective personnel (flagmen, inspectors, maintenance personnel and similar labor) to protect the operation of train traffic during the Contractor's construction activities. Railroad protective services will also be provided in conformance with the Roadway Worker's Protective Act. There will be no charge to the Contractor for Metro-North protective personnel. It is agreed that the providing (or failure to provide) of any conductors, flagmen, groundmen or other employees shall not relieve the Contractor from liability or payment for any damage caused by its operations.

a. The Contractor must obey all instructions from Metro-North representatives on the job site promptly. Failure to follow instructions shall be deemed sufficient cause for closing the job site to the Contractor and its employees.

b. The Railroad will at its sole discretion, determine the need for and the availability of protective, support personnel. The Railroad will provide protective forces to the extent possible considering operational and maintenance priorities. The Railroad makes no guarantee that protection personnel will be available to meet the Contractor's preferred schedule. Further, no such work may actually commence until the assigned Railroad representative affirmatively advises the Contractor that the necessary protective forces are stationed and that he may proceed.

c. The assessment of the need for protective services will be based upon a Weekly Railroad Coordination Meeting. At these meetings the Contractor shall provide a Bi-weekly Schedule that will begin on the following Saturday. The furnishing of these schedules shall be in accordance with other Contract provisions. Based on that schedule the Railroad will determine the Protective Service required for the two-week period. Protective services will be reserved for the following week beginning on the Saturday and ordered for the second week of the schedule. It will be the Contractor's responsibility to perform work in accordance with its approved schedule. Variations from the approved schedule may result in additional and unnecessary costs to the CTDOT PM, Railroad and Contractor.

The Contractor shall base its operations on a 5-consecutive-day work week. The hours of operation during this time shall remain constant. Multiple shifts may be worked.

The Contractor must demonstrate maximum use of protective service personnel ordered. Failure to do so may cause the inability to consistently obtain services.

d. Requests to cancel construction activities and subsequently, the scheduled protective personnel will be also determined at the Weekly Railroad Coordination Meeting held on the Tuesday. At these meetings, the previously scheduled protective service for the week beginning on the following Saturday may be canceled. This will be the only time for cancellation. No ordering of Protective services for the following week will be allowed.

e. The Contractor shall be held responsible for its trade contractors and suppliers. Weather conditions are considered the only acceptable excuse for nonperformance and only on work items that have been identified and agreed to have been weather dependent when

scheduled. Activities not presented on the Bi-weekly schedule at the Railroad Coordination Meeting will not be able to commence until it has been inserted into the schedule and presented at the next Protective Service Meeting.

f. Work that requires the support of Railroad personnel shall not be scheduled on the following days, unless the work is of an emergency nature:

New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day Following Thanksgiving Day
Christmas Eve
Christmas Day
New Year's Eve
The Saturday and Sunday preceding a Monday holiday.
The Saturday and Sunday following a Friday holiday.
The Friday and Monday preceding and following a weekend holiday.

14. Requirements for Requesting Track Outages

Track outages as described in the plans and specifications must be requested at the weekly Railroad Construction Coordination Meeting held on the Tuesday for the following week (Saturday through Friday) in which the outage is requested.

a. All procedures, material and equipment must be approved and on site prior to accepting the track outages request.

b. Track outages will be granted based on need for constructability not for convenience.

c. The Contractor must demonstrate the maximum use of track outages by coordinating its activities and work so that various elements and multiple activities are performed during approved outages. Failure to consistently utilize track outages may cause the inability to gain approval of future requests for outages.

d. No new track outages may be initiated the weekend preceding or following the following holidays: Thanksgiving, Christmas, and New Year's. However, long-term continuous outages may extend through these periods.

15. Catenary and Transmission Systems/Power Outages

a. Catenary and Transmission Systems - The Contractor shall assume that all the wires on the Railroad Company are energized at all times and must be governed by the restrictions imposed by the Railroad with respect to such electrical circuits. Should it become necessary, in the opinion of the Railroad Engineer to de-energize any wire or wires to insure safety of operation, such wires will be de-energized by the Railroad only during such period that will not interfere with the Railroad's operation. When the de-energizing and re-energizing of wires is deemed necessary, a representative of the Power Department of the Railroad must be on duty and present to arrange for the same. He will

notify the Contractor in writing when the wires have been de-energized and also when said wires are to be re-energized.

b. The Contractor is advised that the overhead electrification will remain in place for the duration of the entire project, except where called for on the drawings and in the specifications.

c. Track rails of the Railroad are energized. Particular care must be taken to see that no contact is made between adjoining rails with any material which is a good conductor of electricity when dry, or material of any nature when wet. Particular care is necessary when any work involving the use of chains, steel rods, cables, pipes, etc., is done. Since the Contractor shall assume the wires and rails of the Railroad will be energized at all times, the Contractor shall require all of its employees, sub-contractors, and others to sign a form similar to the form shown in the NOTICE TO CONTRACTOR – WORK ON RAILROAD PROPERTY contained within the Provisions of the Contract.

d. Power Outages

(1) Catenary Power Outages - A catenary power outage must be scheduled concurrently with a track outage for the track and is restricted to the same periods as specified in the plans and specifications.

(2) Metro-North Railroad Power and Signal Distribution Feeder Outages - Outages for feeders can be allowed only during off-peak hours. These outages should be requested at the weekly Railroad Construction Coordination meeting held on the Tuesday for the following week (Saturday through Friday). One set (north or south) side of Railroad of power and signal feeders must be maintained energized at all times.

NOTE: During peak (5:00 a.m. to 10:00 a.m. and 3:30 p.m. to 10:00 p.m., Monday thru Friday) hours of Railroad traffic, both sets (north and south) of power and signal feeders must be energized.

16. Safety for Contractor's Employees Working on or Adjacent to the Right-of-Way of the Railroad

a. Personal Protection Equipment

(1) Approved hard hats must be worn by all Contractor employees while on the right-of-way in yard, shop facilities, and construction and/or work sites. Approved safety eyewear must be worn by all Contractor employees while on right-of-way, in yard, shop facilities and construction and/or work sites and in the operating control cab of a moving locomotive or train. Department head and Director of Safety must jointly approve any exclusion.

(2) Metro-North Safety Engineer approved reflectorized vest or clothing must be worn by all Contractor employees while on or about tracks and right-of-way and in yards.

(3) Other protective equipment such as goggles, face shields, safety belts, floatation vests, gloves and respirators shall be issued by the Contractor when required. Protection devices for hearing conservation may be used when determined necessary and safe to do so.

b. Possession or use of Drinking Intoxicants and Narcotics

(1) The use of intoxicants, narcotics, marijuana, amphetamines or hallucinogens while on duty, is prohibited and is sufficient cause for dismissal. Contract employees

under medication before or while on duty, must be certain that such use will not affect the safe performance of their duties.

c. Surveying Equipment

(1) Measuring tape must be non-metallic to avoid shunting the signal system electric circuits. This will occur when a metallic object is laid across the top of two rails of any track.

(2) Electrically rated fiberglass elevation rods are to be used to avoid injury in the event contact is made with energized catenary or signal/communication lines. Elevations of catenary wires must be obtained by or under direct supervision of a qualified Metro-North Class ”A” groundman.

d. On or About Track

(1) Contractor employees must walk on tracks or cross tracks only when necessary, and when accompanied by or with permission from a qualified Metro-North employee.

(2) Contractor employees must not enter track unless it is necessary in performance of their duty.

(3) The possession of an umbrella on or about tracks is prohibited.

(4) Do not rest any object on shoulder while close to moving train.

(5) Expect equipment to move on any track, in either direction, at any time. Contractor employees must look in both directions and have permission from a qualified Metro-North employee before:

a. Fouling track
b. Crossing track
c. Going between or around end of equipment or structure
d. Moving out from between or under equipment of structure
e. Getting on or off equipment
f. Performing any other applicable operation

(6) When crossing tracks have permission from a qualified Metro-North employee. Always use approved walkways when available; otherwise take the shortest safe route after looking in both directions. If more than one track is to be crossed, stop and look before crossing each track.

(7) When required by a conductor/flagman or other qualified Metro-North employee to vacate tracks, the Contractor employees must comply immediately.

e. Catenary Electric Systems

(1) All overhead wires must be considered energized (LIVE) at all times except when it is known they have been de-energized and properly grounded.

(2) Until after wires are de-energized and properly grounded, all Contractor employees must not approach within 10-ft of transmission systems wires, catenary system or signal power wires.

(3) At the beginning of each tour of duty, the Class "A" groundman will instruct the Contractor foreman and each Contractor employee in the crew of the dangers

surrounding them, calling their particular attention to any hazards to be encountered by the nature of the work to be done.

(4) If in the opinion of the Class "A" groundman, any Contractor employee in the crew does not understand the instructions due to not having a proper knowledge of the English language, or for any other reason, such person shall not be permitted to work, or observe.

(5) When clearances have been obtained and the wires, equipment or apparatus properly grounded, the Class "A" groundman will indicate to the Contractor foreman and the crew the location of wires, equipment or apparatus from which power has been removed and the location of the grounding devices applied. The Class "A" groundman must obtain on standard form, the signature of the Contractor foreman indicating that he and the crew have been so instructed, and will confine their work within the limits as outlined to them by the Class "A" groundman.

(6) When the Class "A" groundman leaves its crew for any reason, he must notify the Contractor foreman and each person in the crew to stop all work in the vicinity of the wires, personally assuring himself that all persons have moved to a safe distance away from its departure. The Class "A" groundman will obtain the signature of the Contractor foreman on standard form, that he and the crew have been informed that the Class "A" groundman is leaving the gang and they will not resume work until advised to do so on return of the Class "A" groundman.

(7) When the clearances are to be released, the Class "A" groundman will inform the Contractor foreman and each other Contractor employee and will personally observe that all persons have moved to a safe distance from the wires, equipment or apparatus to be energized, before removing the grounding devices. He will obtain the signature of the Contractor foreman, on a standard form, stating that he and the gang have been advised that the wires, equipment or apparatus will be energized, and that they will remain at a safe distance from them until informed otherwise by the Class "A" groundman.

(8) The Class "A" groundman will inform the Contractor foreman if any Contractor employee on the job is unsafe and will not comply with instructions. If trouble is experienced with the Contractor foreman in maintaining safe working conditions, the Class "A" groundman will immediately notify its supervisor.

f. Aerial Catenary Construction by Qualified Contractor Employees

(1) Aerial catenary work included in this Section shall include all overhead wire work included in the portion of the Contract.

(2) Aerial catenary work by the Contractor shall be done in accordance with the Railroad's safety rules and in accordance with the NEC.

(3) Due to the specialty nature of the work, limited construction periods available, and high quality of work required, the aerial catenary construction included within the Contract is to be done only by qualified Contractor employees. Only Contractor employees that meet the requirements of the International Brotherhood of Electrical Worker's standards for Journeyman Lineman and who have successfully completed a Metro-North power orientation class shall be considered for the work of this Section. The power orientation class will be given periodically and will require less than one-half day to complete. Approval for qualification shall be determined by Metro-North and that approval shall not be unreasonably withheld.

(4) Metro-North approved Journeyman Lineman shall be issued identification as workers qualified to perform aerial catenary work. Qualified Contractor employees shall work according to the Railroad's MN-290 Electrical Operating Instructions. Qualified employees are authorized and expected to work to within 36-in of 13.5 kV energized overhead catenary. Contractor employees shall not de-energize circuits, place initial grounds, or provide protection for others.

(5) Apprentice Lineman shall be permitted to assist qualified Journeyman Lineman and work under their direct supervision. Apprentice lineman are prohibited from coming closer than 10-ft from all overhead wires or circuits regardless of whether they have been de-energized or not.

g. Safety Program and Plan

(1) Prior to the commencement of work the Contractor shall submit a Working on the Railroad Safety Plan that will include a Program to implement the plan to the CTDOT PM or a duly authorized representative for forwarding to the Railroad for review of compliance with this specification. This plan is separate to the Health and Safety Plan required for other aspects of the project (i.e., lead, excavations, etc.).

(2) Each employee of the Contractor, trade contractor or others on site shall be given an initial training session prior to being allowed to work on the project, but not on the Railroad Right of Way, at this session the following will be furnished to the employee:

a. Safety Orientation for Contract Employees Working on Metro-North Property produced by the Safety Engineer of Metro-North.
b. Safety Inspection Checklist
c. List of the applicable publications referenced in these specifications with respect to safety and where they are located for review if necessary. The list shall include, but not be limited to, such regulatory standards and mandates, i.e., OSHA, NIOSH, DOL, NFPA, EPA, FRA, MSDS, etc.
d. Copy of the applicable corporate safety plan.
e. Copy of the project Railroad Safety Plan or other project related plans.

The employee shall sign the standard form for acknowledgement of the above-noted documents.

(3) As soon as possible after the initial training, the employee shall also be given a one-hour training session administered by Metro-North Safety Engineer or its representative. All employees receiving this training will receive a Registered Hard Hat sticker that will identify them from the employees with initial training on the project. No Contractor employees are permitted on the Railroad right-of-way without this training.

(4) The Contractor shall hold "TOOL BOX" safety meetings for their employees at least once a week that will be documented and attendees listed.

(5) The Contractor personnel shall attend a monthly Metro- North Safety Meeting.

1.17 INSURANCE REQUIREMENTS – METRO-NORTH RAILROAD

A. Submission of Insurance: The Contractor engaged in work on the project shall be required, before the Contractor begins work on the project, to provide and to maintain insurance in force during the course of the project, at no cost to Metro-North. These insurance policies are in addition to any other forms or insurance or bonds required under the Terms of the Contract.

B. Insurance: The Contractor shall furnish evidence that, with respect to the operations it performs, carries Workmen's Compensation Insurance and Public Liability and Property Damage Insurance covering all the Contractor's operations in any way connected with the project, and to furnish evidence of such policy to Metro-North.

1. Contractor's Public Liability and Property Damage Insurance – The Contractor shall furnish evidence that, with respect to the operations it performs, it carries regular Contractor's Public Liability Insurance providing for a limit of not less than $2,000,000 single limit, bodily injury and/999999or property damage combined, for damages arising out of bodily injuries to or death of all persons in any one occurrence and for damage to or destruction of property, including the loss of use thereof, in any one occurrence.

2. Contractor's Protective Public and Property Damage Liability Insurance – The Contractor shall furnish evidence that, with respect to the operations performed by Trade contractors, it carries in its own behalf regular Contractor's Protective Public Liability Insurance providing for a limit of not less than $2,000,000, single limit, bodily injury and/or property damage combined, for damages arising out of bodily injuries to or death of all persons in any one occurrence and for damage to or destruction of property, including the loss of use thereof, in any one occurrence.

3. Railroad's Protective Public Liability Insurance – In addition to the above, the Contractor shall furnish evidence that, with respect to the operations it or any of its trade contractors perform, it has provided Railroad Protective Public Liability Insurance (AAR-AASHTO Form) in the name of the Metro-North Railroad providing for a limit of not less than $2,000,000 single limit, bodily injury and/or property damage combined, for damages arising out of bodily injuries to or death of all persons in any one occurrence for damage to or destruction of property, including the loss of use thereof, in any one occurrence. Such insurance shall be furnished with an aggregate of less than $6,000,000 for all damages as a result of more than one occurrence. The named insured shall include:

Metro-North Commuter Railroad
Metropolitan Transportation Authority of New York
Connecticut Department of Transportation
Consolidated Rail Corporation
National Railroad Passenger Corporation
Providence and Worcester Railroad Company

The insurance hereinbefore specified shall be carried until all work on the project is satisfactorily completed and formally accepted. Failure to carry or keep such insurance in force until all work is satisfactorily completed shall constitute a violation of the project Contract.

The Contractor shall furnish to Metro-North a signed copy of the policy for Contractor's Public Liability Insurance and Protective Public Liability Insurance and the original copy of the Railroad Protective Public Liability Insurance. If any work is

trade contracted, the Contractor shall furnish a signed copy of the policy for Contractor's Public Liability Insurance.

This policy shall be endorsed to the effect that for the purposes of this insurance, the employees of the Railroad Company, as listed below, shall be considered the same as regular employees of the Contractor:

a. Any watchman, flagman and similar employee who is employed by the Railroad Company and is specifically assigned or furnished by the Railroad Company for work in connection with the Project.
b. Any employee of the Railroad Company while operating the work trains or other equipment while engaged in the performance of work directly involved in this Contract.

4. The insurance described in Paragraphs above, shall be endorsed to provide for not less than 30 days advance written notice to Metro-North of any change or cancellation of policies. Said notice shall be sent to the individual identified in the NOTICE TO CONTRACTOR – WORK ON RAILROAD PROPERTY contained within the Provisions of the Contract. Work may not proceed on Metro-North property until all insurance requirements have been met to the satisfaction of Metro-North's Engineer.

COSTS ASSOCIATED WITH THIS SPECIFICATION

A. There shall be no direct payment for this work, regulatory requirements, traffic regulation, administering of the specification, coordination and incidentals to fulfill the requirements of this specification. The cost thereof will be considered as included in the general cost of the work and distributed in all items.

B. Any work, materials supplied, inspections and protective services by Metro-North as described in the plans and specification expressly needed for the construction of the project will be compensated by the CTDOT PM on a separate agreement.

1.18 CONTROL OF MATERIALS

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

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

The General Statutes include the following limitations:

> Vehicle Width (Section 14-262(a)(1)) - The width of a vehicle and combination vehicle and trailer, including its load, is limited to 8 feet 6 inches, without a permit.
>
> Vehicle Length (Section 14-262(c)) - The length of the semitrailer portion of a tractor-trailer unit, including its load, is limited to 48 feet, without a permit.
>
> Vehicle Height (Section 14-264) - The height of a vehicle, with its load, is limited to 13 feet 6 inches, without a permit.
>
> Vehicle Weight (Section 14-267a (b)(7)) - The gross vehicle weight (weight of vehicle including its load) is limited to 80,000 pounds on 5 axles for vehicles with a 51 foot wheelbase, without a permit.
>
> Axle Weights of Vehicles (Section 14-267a) - For the above five axle vehicle, weight on a single axle may not exceed 22,400 pounds or in the case of axles spaced less than 6 feet apart, 18,000 pounds.

On Department projects, in accordance with the Commissioner’s policy, any member or component, either temporary or permanent, that measures 120 feet or less and weighs no greater than 120,000 pounds, is transportable via an authorized permit route established by the Department provided the individual axle weights on the vehicle and trailer transporting the member or component do not exceed 20,000 pounds.

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

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

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

1.19 LEGAL RELATIONS AND RESPONSIBILITIES

A. Load Restrictions:

1. Vehicle Weights: This sub article 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 CTDOT PM 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.

2. 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 material 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, to the CTDOT PM 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."

B. Contractor's Duty to Indemnify the State against Claims for Injury or Damage:

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

1.21 PRE-INSTALLATION MEETINGS

The Contractor and CTDOT PM will conduct a pre-installation meeting at the Project Site before each of the following construction activities:

1. Installation of utilities beneath, above or within ten feet of an existing railroad track.
2. HMA S 0.5"
3. CSI SECTION 31 62 13.19 - PRECAST CONCRETE PILES
4. CSI SECTION 31 62 13.19 - PILE LOADING TEST
5. CSI SECTION 03 30 00 - CAST-IN-PLACE CONCRETE
6. CSI SECTION 04 27 31 - REINFORCED UNIT MASONRY
7. CSI SECTION 07 14 00 - FLUID APPLIED WATERPROOFING
8. CSI SECTION 07 42 64 - ALUMINUM COMPOSITE MATERIAL WALL PANELS
9. CSI SECTION 07 54 00 - THERMOPLASTIC MEMBRANE ROOFING
10. CSI SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM
11. CSI SECTION 07 72 00 - ROOF ACCESSORIES
12. CSI SECTION 08 71 00 - FINISH DOOR HARDWARE
13. CSI SECTION 09 30 00 - TILING
14. CSI SECTION 09 51 00 - ACOUSTICAL CEILINGS
15. CSI SECTION 09 65 00 - RESILIENT FLOORING AND BASE
16. CSI SECTION 23 74 13 - PACKAGED OUTDOOR ROOFTOP AIR–HANDLING UNITS
17. CSI SECTION 26 32 13 - ENGINE GENERATORS
18. CSI DIVISION 27 - COMMUNICATIONS (AND INFORMATION TECHNOLOGY)
19. CSI DIVISION 28 - FIRE ALARM SYSTEM
20. CSI SECTION 44 11 16 - INDUSTRIAL DUST COLLECTOR
21. CSI SECTION 44 11 37 - FUME AND EXHAUST EXTRACTION SYSTEMS

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.

1.22 NOTICE TO CONTRACTOR - METRO-NORTH RAILROAD COORDINATION

The Trade Contractor is hereby notified that following represents construction services and material to be furnished and completed by Metro-North Railroad (MNRR):

1. MNRR shall furnish and install permanent lock cores for new facility.

2. MNRR shall provide flagmen as required during construction.

3. The Lenel VAR shall make all final connections to existing MNRR security systems; MNRR shall make final connections for MNRR communications systems.

4. MNRR shall arrange for shut-off of electric feed in advance of Trade Contractor connection to in-service P & P1 feeder lines.

5. MNRR shall coordinate power shutdown for MOW electrical feed connection.

The above list may not be all-inclusive and does not relieve the Trade Contractor from its responsibility to coordinate work with MNRR that is required under other Contract provisions.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 11 00

SECTION 01 18 13 – UTILITY SERVICE CONNECTIONS

PART 1 GENERAL

1.1 WORK SUMMARY:

A. Description: This work shall consist of payment to utility companies by the Construction Manager for the utility company's work to install, relocate, and/or adjust certain utility facilities which are affected by the project. The Construction Manager is responsible to hire and coordinate with the affected utility companies to adjust their respective facilities affected by the Contract work, and to coordinate other Contract work required to facilitate the utility company's work. The utility work required in this Contract includes:

1. A new Southern Connecticut Gas Company (SCGC) gas service is required to the new MOW building and the gas-fired stand-by generator serving the building.

2. A new sanitary sewer service connection is required for the MOW Building. The Construction Manager will be required to file a new service connection permit with Greater New Haven Water Pollution Control Authority (GNHWPCA). In addition to the permit, the Construction Manager will also be required to pay a onetime sewer connection fee to the GNHWPCA, which is based on the size of the water service piping to the building. These permit and fee requirements must be satisfied prior to the GNHWPCA performing any inspection services.

B. This work shall include coordination with SCGC, GNHWPCA, Metro-North Railroad (MNRR), and CT DOT, for installing the service connection from existing SCGC and GNHWPCA infrastructures to the new facility. Any damage caused by the Construction Manager or Trade contractors, as determined by the CTDOT PM, shall be corrected by the Construction Manager in accordance with this specification.

C. The Construction Manager shall coordinate Contract work required in support of the utility company's work, such as trenching and backfilling, conduit or pole installation, duct bank or concrete pad installation.

PART 2 PRODUCTS

2.1 MATERIALS

A. All materials shall be provided by the Construction Manager, unless otherwise provided by SCGC or the GNHWPCA, and shall meet the current standards of the affected service.

PART 3 EXECUTION

3.1 GENERAL

A. The SCGC work under this specification shall be performed only by the affected utility company who owns the facilities being relocated or connected to, or by the utility company's authorized trade contractor. The Construction Manager shall coordinate all work performed by the utility company with facility occupants, affected adjacent property owners, and CT

DOT, and as directed by the CTDOT PM. Certain work may require use of a licensed and/or certified tradesman when such work is required by local and/or state codes.

B. The Construction Manager is responsible for all work related to the new sanitary sewer connection. The Construction Manager shall coordinate all sanitary sewer work with the GNHWCA, affected adjacent property owners, and CT DOT, and as directed by the CTDOT PM. Certain work may require use of a licensed and/or certified tradesman when such work is required by local and/or state codes.

C. Any of the affected utility or other utility customer's service interruption shall be done in a way that minimizes adverse impacts to the customer and affected utility.

D. Any labor, materials, and equipment supplied by the affected utility, or other utility companies shall be billed to the Construction Manager.

END OF SECTION 01 18 13

SECTION 01 20 00 CONTRACT CONSIDERATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Contract Documents and general provisions of the Contract, including General and Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Unit Prices

B. Related Sections: The following Sections contain requirements that relate to this Section:

2. Division 01 Section 01 26 00 Contract Modification Procedures.

3. Division 01Section 01 29 76 Progress Payment Procedures.

4. Division 01 Section 01 77 00 Closeout Procedures.

1.3 UNIT PRICES - GENERAL

A. This Section includes administrative and procedural requirements for unit prices.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 26 00 Contract Modification Procedures for procedures for submitting and handling Change Orders.

2. Division 01 Section 01 29 76 Progress Payment Procedures for procedures for submitting Application for Payments.

C. Definitions:

1. Unit Price: Amount the Construction Manager acknowledges in the Bid Form as a price per unit of measurement for materials or services as described in the Bidding Documents or in the Contract Documents.

D. Procedures:

1. Unit Prices included in the Contract Documents are to be used for determining compensation to the Construction Manager or Owner for changes to the scope of the work indicated in the Contract Documents, and included in the Lump Sum Contract Price. Special Unit Prices are for items complete, in place, and shall be inclusive of furnishing and installing of all material, labor, trucking, overhead, profit, equipment, hoisting, engineering, scaffolding, power hookups, protection, shop drawings, taxes, permits, appliances, delivery, insurance, supervision, cost of bond, etc. and shall remain in effect until completion of the Contract.

2. Unit Price: Is identified by the Owner as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if the estimated quantities of Work required by the Contract Documents are increased or decreased.

a. Should the amount of the Work required be increased or decreased because of changes in the work ordered in writing by the CT DOT Project Manager, the Construction Manager agrees that the following supplemental UNIT PRICES will be decreased 10% for a reduction of work. Each Unit Price shall include all equipment, tools, labor, permits, fees, etc., incidental to the completion of the work involved. All items marked with an asterisk (*****) in the unit price schedules shall include the completion of the excavation, formation and compaction of sub-grade and the disposal of surplus or unsuitable materials in accordance with the Plans and Specifications or as directed by the CT DOT Project Manager.

3. The Owner reserves the right to reject the Construction Manager's measurement of work-in-place that involves use of established unit prices, and to have this work measured, at the Owner's expense, by an independent surveyor acceptable to the Construction Manager.

4. Defect Assessment: Replace the Work, or portions of the Work, not conforming to the specified requirements. If, in the opinion of the CTDOT PM, it is not practical to remove and replace the work the Engineer will direct an appropriate remedy or adjust the payment.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 20 00

SECTION 01 25 00 SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for handling requests for equals and substitutions made after award of the Contract.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 33 00 Submittal Procedures specifies requirements for submitting the Contractor's Construction Schedule and the Submittal Schedule.

2. Division 01 Section 01 33 00.13 Document Control for requirements related submissions and the use of the Primavera Construction Manager.

3. Division 01 Section 01 42 20 Reference Standards and Definitions specifies the applicability of industry standards to products specified.

4. Division 01 Section 01 60 00 Product Requirements specifies requirements governing the Contractor's selection of products and product options.

1.3 DEFINITIONS

A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.

B. **Equals or Substitutions General:** Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract.

1.4 SUBMITTALS

A. **Equals and Substitution Request Submittals:** The Owner will consider requests for equals or substitutions if made prior to the Receipt of the Competitive Bid except as noted otherwise. The information on all materials shall be consistent with the information herein. After the contract award, substitutions will be considered for materials or systems specified that are no longer available. It will not be considered if the product was not purchased in a reasonable time after award. The Contractor shall submit all equal and substitutions requests on the **"Equal or Substitute Product Request"** Form, an example is shown at the end of this Section and the Form is available from the Construction Representative (CA). See Article 15 in the General Conditions for further refinement and information.

B. The Contractor is required to prepare and submit three (3) copies of the required data for the first manufacturer listed or procedure listed in the specifications section with reference to all of the following areas: the substance and function considering quality, workmanship, economy of operation, durability and suitability for purposes intended including the size, rating performance, and cost. All submissions must include all the required data for the first listed manufacturer or procedure as specified, as well as the required data for the proposed Equal or Substitution. This will enable the Owner and CTDOT PM to determine that the

proposed Equal or Substitution is or is not substantially equal to the first listed manufacturer or procedure.

1. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.

2. Provide complete documentation showing compliance with the requirements for equals or substitutions, and the following information, as appropriate:

a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors that will be necessary to accommodate the proposed Equal or Substitution.

b. A detailed comparison chart of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.

c. Product Data, including Shop Drawings and descriptions of products and fabrication and installation procedures.

d. Samples, where applicable or requested.

e. A statement indicating the effect on the Contractor's Construction Schedule or CPM Schedule compared to the schedule without approval of the Equal or Substitution. Indicate the effect on overall Contract Time.

f. Cost information, broken down, including a proposal of the net change, if any in the Contract Sum.

g. The Contractor's certification that the proposed Equal or Substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.

h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the Equal or Substitution to perform adequately.

3. Engineer's Action: If necessary, the Engineer will request additional information or documentation for evaluation within seven (7) days of receipt of the original request for equal or substitution request. The Engineer will notify the CT DOT Project Manager who will notify the Owner of recommended acceptance or rejection of the proposed equal or substitution, within fourteen (14) days of receipt of the request, or seven (7) days of receipt of additional information or documentation, whichever is later. The CT DOT Project Manager will give final acceptance or rejection by the Owner not less than seven (7) days after notification.

a. Any request deemed an "Equal" and accepted by the CT DOT Project Manager, Engineer, Owner, and Agency will result in written notification to the Contractor and will <u>not</u> be in the form of a change order for an "Equal".

b. Any request deemed a "Substitution" and rejected or approved by CT DOT Project Manager, Engineer, and Owner may result in written notification to the Contractor and may be in the form of a change order if the "Substitution" is approved.

PART 2 - PRODUCTS

2.1 EQUAL OR SUBSTITUTIONS

A. Conditions: The CTDOT PM will consider the Contractor's request for Equal or Substitution of a product or method of construction when one or more of the following

conditions are satisfied, as determined by the Engineer. If the following conditions are not satisfied, the Engineer will return the requests to the CT DOT Project Manager without action except to record noncompliance with these requirements.

1. The proposed request does not require extensive revisions to the Contract Documents.

2. The proposed request is in accordance with the general intent of the Contract Documents.

3. The proposed request is timely, fully documented, and/or properly submitted.

4. The proposed request can be provided within the Contract Time. However, the Engineer will not consider the proposed request if it is a result of the Contractor's failure to pursue the Work promptly or coordinate activities properly.

5. The proposed request will offer the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. However, if the proposed request requires the Owner to incur additional responsibilities, including but not limited to, additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or similar considerations, then the Owner will have just cause to reject the request for Equal or Substitution.

6. The proposed request can receive the necessary approvals, in a timely manner, required by governing authorities having jurisdiction.

7. The proposed request can be provided in a manner that is compatible with the Work as certified by the Contractor.

8. The proposed request can be coordinated with the Work as certified by the Contractor.

9. The proposed request can uphold the warranties required by the Contract Documents as certified by the Contractor.

B. The Contractor's submission and the Engineer's review of Submittals, including but not limited to, Samples, Manufacturer's Data, Shop Drawings, or other such items, which are not clearly identified as a request for an Equal or Substitution, will not be considered or accepted as a valid request for an Equal or Substitution, nor does it constitute an approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 25 00

Connecticut

Department of Construction Services

7001
Equal or Substitute Product Request

Request Phase Pre-Bid ☐ Post Bid ☐ (*See Article 15 Materials: Standards, General Conditions*)

(If Pre-bid only) Current Bid Due Date: _____ **Request No.:** _____ **Dated:** _____

To: State of Connecticut **CTDCS Project No.:** _____
Department of Construction Services **Project Name / Location:**

References: Specification(s): Section(s): _____ Paragraph(s): _____
Drawing(s): Drawing(s) No(s): _____ Detail(s) No(s): _____

Contractually Specified Product: _____
Contractor Proposed Product: _____

Proposed Product is : Equal: ☐ Substitute: ☐ Model No.: _____

*See attached data for **both** specified and proposed products as required by Article 15 General Conditions.*

Data attached: Drawings: ☐ Product Data: ☐ Reports: ☐ Samples: ☐
Tests: ☐ Other: _____

Reason(s) for not providing the Specified Product:

Similar Installation:
Project: Architect:
Address: Owner:
Date Installed:

Will proposed substitution impact other parts of the Work? No ☐ Yes ☐ *If yes attach explanation.*
Will proposed substitution increase Contract Time? No ☐ Yes ☐ *by number of Days* _____

Actual Dollar Savings to the State of Connecticut if substitution is accepted: **$**

The Undersigned Certifies that the proposed Request for an Equal or Substitute Product conforms to all of the requirements of Division 01 General Requirements, Section 01 25 00 Substitution Procedures .

Request Submitted By General Contractor / CMR: _____
(Firm's Typed Name)

By: _____ _____ _____ _____
(Typed Name) *(Title)* *(Signature)* *(Date)*

CONTRACTOR / CMR Send copies to DCS PM: ☐ CA /OR: ☐

Consultant's Review – This Substitution Request is: Request Received on (Date): _____

☐ **Approved:** *(Submittals in accordance with Div. 01 General Requirements, Section 01 33 00 Submittal Procedures.)*
☐ **Approved as Noted:** *(Submittals in accordance with Div. 01 General Requirements, Section 01 33 00 Submittal Procedures.)*
☐ **Rejected:** **Use Specified Materials.**
☐ **Rejected:** **Request Not Received Within Specified Time Period - Use Specified Materials.**

Reviewed Issued By: _____ _____ _____
(Typed Name) *(Signature)* *(Date)*

CONSULTANT Send copies to: DCS PM: ☐ CA /OR: ☐ Chief Architect ☐ Chief Engineer ☐

If Approved: As noted by Consultant,
DCS Chief Architect: _____ _____
(Signature) *(Date)*

Copies: Project File Red R2

SECTION 01 26 00 CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 20 00 “Contract Considerations" for administrative requirements governing use of Unit Prices.

2. Division 01 Section 01 25 00 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after award of the Contract.

3. Division 01 Section 01 29 76 "Progress Payment Procedures" for administrative procedures governing Applications for Payment.

4. Division 01 Section 01 32 16.13 "CPM Schedules" for requirements for CPM scheduling and reporting progress of work.

5. Division 01 Section 01 33 00 "Submittal Procedures" for requirements governing the overall preparation and submission of required submittals, including but not limited to Metro-North Railroad submittals, United Illuminating submittals and FM Global submittals.

6. Division 01 Section 01 33 00.13 Document Control for requirements related submissions and the use of the Primavera Construction Manager.

1.3 REQUESTS FOR INFORMATION

A. In the event that the Contractor or trade contractor, at any tier, determines that some portion of the drawings, specifications, or other contract documents requires clarification or interpretation by the Engineer, the Contractor shall submit a "Request for Information" in writing to the Engineer via the CT DOT Project Manager. "Requests for Information" may only be submitted by the Contractor and shall only be submitted on the "Request for Information" forms as required by the Owner.

1. In the "Request for Information", the Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed from the Engineer.

2. In the "Request for Information", the Contractor shall set forth an interpretation or understanding of the requirement along with reasons why such an understanding was reached.

3. The Owner acknowledges that this is a complex project. Based upon the owner's past experience with projects of similar complexity, the Owner anticipates that there will probably be some "Requests for Information" on this project.

4. The Engineer will review all "Requests for Information" to determine whether they are valid "Requests for Information". If it is determined that the document is not a valid "Request for Information", it will be returned to the Contractor, unreviewed as to content, for resubmittal on the proper form and in the proper manner.

5. A "Requests for Information Response" shall be issued within seven (7) days of receipt of the request from the Contractor unless the Owner determines that a longer time is necessary to provide an adequate response. If a longer time is determined necessary by the Owner, the Owner will, within seven (7) days of receipt of the request, notify the Contractor of the anticipated response time. If the Contractor submits a "Request for Information" on an activity with seven (7) days or less of float on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Engineer to respond to the request provided that the Engineer responds within the seven (7) days set forth above.

6. A "Request for Information Response" from Owner will not change any requirement of the Contract Documents. In the event the Contractor believes that the "Request for Information Response" will cause a change to the requirements of the Contract Documents, the Contractor shall within five (5) Days give written notice to the CT DOT Project Manager stating that the Contractor believes the "Request for Information Response" will result in a "Change Order" and the Contractor intends to submit a "Change Order Proposal" request. Failure to give such written notice within five (5) Days shall waive the Contractor's right to seek additional time or cost under the requirement these Requirements.

1.4 MINOR CHANGES IN THE WORK

A. The Engineer, through the CT DOT Project Manager, will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time, on the "Supplemental Instructions" form as required by the Owner.

1.5 PROPOSAL REQUEST

A. Owner-Initiated Requests For Proposals: The Owner will issue a detailed description of proposed changes in the Work via the CT DOT Project Manager that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications. Such requests shall be on a "Proposal Request" form as required by the Owner.

1. "Proposal Request" is issued for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.

2. Within (14) days of receipt of a "Proposal Request", submit a "Change Order Proposal" with the required information necessary to execute the change to the CT DOT Project Manager for the Engineer's/Owner's review.

a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.

b. Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.

c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

d. The Agency is tax exempt. All Contractor and Trade Contractor services provided under your Contract with the State of Connecticut may not be exempt from taxes. The Department of Revenue Services can guide you as to which services are exempt and which are not. Please contact the State of Connecticut, Department of Revenue Services at 1-800-382-9463 or 860-541-3280.

e. Dollar values shown on the Schedule of Values shall not be the governing (or deciding) final amounts for change orders involving either additional charges or deletions.

1.6 CHANGE ORDER PROPOSAL

A. When either a "Request for Information" from the Contractor or a "Proposal Request" from the CTDOT PM or Owner results in conditions that may require modifications to the Contract, the Contractor may propose changes by submitting a request for a "Change Order Proposal" to the Engineer via the CT DOT Project Manager on forms as required by the Owner. These forms shall also include "Change Order Proposal Worksheets" as required by the Owner.

1. Include statements outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.

2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. As directed by the CTDOT PM, furnish survey data to substantiate quantities.

3. Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.

4. Comply with requirements in Division 01 Section 01 25 00 "Substitution Procedures" if the proposed change requires an equal or substitution of one product or system for a product or system specified.

5. The State of Connecticut construction contract has the following tax exemptions:

a. Purchasing of materials which will be physically incorporated and become a permanent part of the project.

b. Tools, supplies and equipment used in fulfilling the construction contract are not exempt.

c. Services that are resold by the contractor are exempt, i.e. if a Contractor hires a plumber, carpenter or electrician, a resale certificate may be issued to the trade contractor because these services are considered to be integral and inseparable component parts of the building contract

B. "Change Order Request" Forms: Use "Change Order Proposal" and "Change Order Proposal Worksheets" forms as required by Owner.

C. A "Change Order Proposal" cannot be submitted without either prior submission of a "Request for Information" from the Contractor or as a response to a "Proposal Request" submitted by the CTDOT PM or Owner.

D. Any "Change Order Request" submitted without a prior submittal of a "Request for Information" or as a response to a "Proposal Request" will be immediately rejected and returned to the Contractor.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. "Construction Change Directive":

When the Owner and the Contractor disagree on the terms of a "Change Order Proposal" resulting from either a "Request for Information" or "Proposal Request", then the Engineer through the CT DOT Project Manager may issue a "Construction Change Directive" on a "Construction Change Directive" form as authorized by the Owner. The "Construction Change Directive" instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a "Change Order".

1. The "Construction Change Directive" contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.

2. Contractor must proceed with the Work once a "Construction Change Directive" is issued.

3. The change in the Contract Sum and Contract Time resulting from the issuance of a "Construction Change Directive" will be based on "Time & Material" or "Unit Prices".

4. Issuance of "Construction Change Directive" does not guarantee payment for the Work described in the "Construction Change Directive".

B. Documentation: The Contractor shall maintain detailed records on a time and material basis of work required by the "Construction Change Directive".

1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

2. The final value shall be negotiated based on the supporting data to determine the value of the work.

1.8 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Contractor's "Change Order Proposal", the CT DOT Project Manager will issue a "Change Order" for signatures of the Owner and the Contractor on a "Change Order" form as required by the Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 26 00

SECTION 01 29 76 PROGRESS PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies procedures for preparation and submittal of the Contractor's Applications for Payment.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Division 01 Section 01 32 16.13 CPM Schedules for requirements for CPM scheduling and reporting progress of work.

2. Division 01 Section 01 33 00 Submittal Procedures specifies requirements for submitting the Contractor’s Construction Schedule and the Submittal Schedule..

3 Division 01 Section 01 33 00.13 Document Control for requirements related submissions and the use of the Primavera Construction Manager.

4. Division 01 Section 01 77 00 Closeout Procedures for requirements for Final Payment.

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the "Schedule of Values" with preparation of the CPM Schedule or Construction Schedule. Use "Schedule of Values" form as required by the Owner

1. Submit the "Schedule of Values" to the CT DOT Project Manager at the earliest possible date but no later than twenty-one (21) days after Contract Start Date.

2. Sub-schedules: Where Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the "Schedule of Values". Provide at least one line item for each Specification Section on electronic media printout.

1. Identification: Project identification on the Schedule of Values shall include, but not be limited to, the following:

a. Owner

b. Project Number

c. Project Name

d. Project Location

e. Contractor's name and address.

2. Arrange the "Schedule of Values" in tabular format as required by the Owner, containing separate columns including, but not limited to, the following Items:

a. Item Number.

b. Description of Work with Related Specification Section or Division Number.

c. Scheduled Values broken down by description number, type material, units of each material.

   1) Include break down of General Condition requirements, i.e. bonds, insurance premiums, taxes, job mobilization, temporary facilities, field supervision and layout, operation and maintenance manuals, punch list activities, project record documents, demonstration and training, overhead, and profit as separate line items.

d. Name of trade contractor.

e. Name of manufacturer or fabricator.

f. Name of supplier.

g. Retainage.

h. Contract sum in sufficient detail.

3. Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual Table of Contents. Break principal trade contract amounts down into several line items. In addition, the following items listed below must be included.

a. **Site Logistics Plan (01 31 00)** a lump sum at 1/20 of one percent of the base bid total project cost at the time of submission of this plan.

b. **Coordination Drawings (01 31 00)** a lump sum of this cost for payment at the submittal of this product a minimum cost of 1/10th of one percent of the base bid total project cost or $5,000 whichever is greater..

c. **Photographic Documentation (01 32 33)** a monthly cost of $1,000 per month to be paid each month upon receipt of the photographs or forfeit of that month's payment.

d. **Submittal Schedule (01 33 00)** a lump sum payment calculated at 1/20th of 1% of the base bid total project cost upon receipt of the schedule

e. **Waste Collection & Cleaning (01 50 00)** a monthly cost. A minimum payment of $1,000 to $3,000 (based on size & complexity of the project) with forfeit of that monthly payment if not done.

f. **As-Built Updates (01 31 00)** a monthly cost, a minimum payment of $1,000 with forfeit of that monthly payment if not done.

g. **Start-up and Adjusting (01 75 00)** a lump sum cost upon completion. (to be determined by PM with A/E & CA/CM advice)

h. **Schedule (01 32 16.13)** a lump sum payment upon receipt of the base line schedule. A payment of 40% of the total amount of the total cost which is to be calculated at 1/8th of one percent of the base bid total project cost. Monthly updates using the remainder of the cost divided evenly over the accepted schedule duration with a forfeit of the monthly payment of the update is not received on time.

   Any forfeited amounts being withheld by the CA for non-performance will be adjusted at the final payment by a credit change order to the owner.

5. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.

6. **Unit-Cost Allowances:** Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.

7. **General Conditions:** Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.

   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and CT DOT Project Manager and paid for by the Owner.

1. The initial "Application for Payment", the "Application for Payment" at time of "Substantial Completion", and the final "Application for Payment", involve additional requirements.

B. Payment-Application Terms: The Owner will process monthly progress payments. The Contractor may submit applications for payment on a monthly basis.

C. Payment-Application Forms: Use the "Application for Payment" form as required by the Owner. Present the required information on electronic media printout or Owner approved form; multiple pages should be used if required.

1. For each item, provide a column including but not limited to the following items:

a. Item Number.

b. Description of Work and Related Specification Section or Division.

c. Scheduled Value, break down by units of material and units of labor.

d. Work Completed from previous application.

e. Work Completed this period.

f. Materials presently stored.

g. Total Completed and stored to date of application.

h. Percentage of Completion.

i. Balance to Finish.

j. Retainage.

D. Application Preparation: Complete every entry on the Application form. At the time of Final Payment only, include an executed Application form by a person authorized to sign legal documents on behalf of the Contractor. The CT DOT Project Manager will return incomplete Applications without action.

1. Entries shall match data on the "Schedule of Values".

2. Include amounts of Change Orders issued prior to the last day of the construction period covered by the application.

E. Transmittal: Except for final payment, submit to the CT DOT Project Manager by a method ensuring receipt within forty-eight (**48**) hours. One (**1**) complete, signed and notarized original of each Application for Payment, including lien waivers and similar attachments

when required, along with six (**6**) copies. For Final Payment, nine (**9**) complete, signed and notarized copies shall be submitted.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Architect.

F. Applications for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment and all subsequent Application for Payments including, but not limited to, the following items:

1. List of trade contractors and suppliers' name, FEIN/Social Security numbers, and Connecticut Tax Registration Numbers.

2. List of principal suppliers and fabricators.

3. Schedule of Values.

4. Contractor's Construction Schedule (preliminary if not final).

5. Schedule of principal products.

6. Submittal Schedule (preliminary if not final).

7. List of Contractor's staff assignments.

8. List of Contractor's principal consultants.

9. Copies of all applicable permits.

10. Copies of authorizations and licenses from governing authorities for performance of the Work.

11. Proof that trade contractors have been paid amounts included on the Contractor's Application for Payment within thirty (30) days after the Owner has paid the Contractor for the particular Application for Payment in accordance with Connecticut General Statute § 49-41a (a)(1).

12. Releases of Lien from trade contractors with amounts included on the Contractor's Application for Payment when Contractor has been paid by the Owner for the particular Application for Payment but the trade contractors have not been paid.

13. Proof that as-built documents and as-built REVIT models are updated as required by Section 01 77 00 "Closeout Procedures.

14. Initial as-built survey and damage report, if required.

15. Update the "Contractor's Master Trade Contract Agreement List" and submit copies all recently executed Trade Contract Agreements in accordance with CGS § 4b-96.

a. The "Contractor's Master Trade Contract Agreement List" shall list all Trade Contract Agreements in order of Contract Sum magnitude (from high to low) in the following format:

Contractor's Master Trade Contract Agreement List				
Trade Contractor Name	**Minority Or Small Business Designation**	**Trade**	**Address**	**Contract Sum**

16. In accordance with CGS § 42-158j (b):

Each payment requisition submitted shall include a statement showing the status of all pending construction change orders, other pending change directives and approved changes to the original contract or trade contract. Such statement shall identify the pending construction change orders and other pending change directives, and shall include the date such change orders and directives were initiated, the costs associated with their performance and a description of any work completed. As used in this section, "pending construction change order" or "other pending change directive" **means an authorized directive for extra work that has been issued to a contractor or a trade contractor and identified by an official Change Order Number or Construction Change Directive Number assigned by the State of Connecticut.**

G. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion submit an Application for Payment form; use the form as required by the Owner. Present the required information on electronic media printout as applicable that include, but are not limited, to the following:

1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

2. Administrative actions and submittals that shall precede or coincide with this application include, but are not limited to, the following:

a. Occupancy permits and similar approvals.

b. Warranties (guarantees) and maintenance agreements.

c. Test/adjust/balance records.

d. Maintenance instructions.

e. Meter readings.

f. Startup performance reports.

g. Changeover information related to Owner's occupancy, use, operation, and maintenance.

h. Final cleaning.

i. Application for reduction of retainage and consent of surety.

j. Advice on shifting insurance coverage.

k. Final progress photographs.

l. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

H. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include, but are not limited, to the following:

1. Completion of Project Closeout requirements.

2. Completion of list of items remaining to be completed as indicated on the attachment to the Certificate of Substantial Completion.

3. Ensure that unsettled claims will be settled.

4. Ensure that incomplete Work is not accepted and will be completed in accordance with a schedule prepared by the Contractor which is acceptable to the Owner.

5. Transmittal of required Project construction records to the Owner (including as-built documents and as-built REVIT models specified in Section 01 77 00 "Closeout Procedures").

6. Certified property survey.
7. Proof that taxes, fees, and similar obligations were paid.
8. Removal of temporary facilities and services.
9. Removal of surplus materials, rubbish, and similar elements (Reference Section 01 74 19 "Construction Waste Management & Disposal").
10. Change of door locks to Owner's access.
11. The requirements of the General Conditions and Supplementary Conditions for Final Acceptance, Final Completion, Final Inspection, and Final Payment.
12. Asbestos, lead or other hazardous material manifests.
13. Completion of "Building Contractor Reporting Form" as supplied by Department of Construction Services, for all Contractors, Trade Contractors, Vendors, Suppliers, etc. who work on the Contract. The form includes the following information:
    a. Contractor/Trade Contractor name.
    b. FEIN
    c. Connecticut Tax Registration Numbers
    d. Type of work
    e. Name of business and address
    f. Remittance address.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 29 76

SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. General project coordination procedures.

2. Conservation.

3. Coordination Drawings, including Site Logistics Plans.

4. Administrative and supervisory personnel.

5. Cleaning and protection.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 29 76 Progress Payment Procedures for Schedule of Values items

2. Division 01 Section 01 32 16.13 CPM Schedules for requirements for CPM scheduling and reporting progress of work.

3. Division 01 Section 01 50 00 Temporary Facilities and Controls.

4. Division 01 Section 01 60 00 Product Requirements for coordinating general installation.

5. Division 01 Section 01 71 23 Field Engineering specifies procedures for field engineering services, including establishment of benchmarks and control points.

6. Division 01 Section 01 77 00 Closeout Procedures for coordinating contract closeout.

7. Division 01 Section 01 91 00 Commissioning defines the commissioning process.

1.3 CT DOT PROJECT MANAGER

A. CT DOT Project Manager:

1. The CT DOT Project Manager is identified in Division 01 Section 01 11 00 Summary of Work.

2. Construction Mobilization:

a. Cooperate with the CT DOT Project Manager in the allocation of mobilization areas of the site, for field offices and sheds, for agency facility access, traffic, and parking facilities.

b. During Construction, coordinate use of site and facilities through the CT DOT Project Manager.

c. Comply with CT DOT Project Manager's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

d. Comply with instructions of the CT DOT Project Manager for use of temporary utilities and construction facilities.

e. Coordinate field engineering layout as specified in Division 01 Section 01 71 23 "Field Engineering" for work under the instructions of the CT DOT Project Manager.

1.4 COORDINATION

A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.

3. Make provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the CT DOT Project Manager, Owner and separate contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.

2. Installation and removal of temporary facilities.

3. Delivery and processing of submittals.

4. Progress meetings.

5. Project closeout activities.

6. REVIT model As-Builts and Drawing As-Builts - coordinate monthly meetings to assure up-dates being performed

1.5 SUBMITTALS

A. Coordination Drawings: Prepare coordination drawings to complete detailed coordination of systems and components and to integrate information about fabrication and installation. The Contract requires that the Contractor use a Building Information Model (“BIM” or REVIT model) to prepare the coordination drawings and for clash detection. See paragraph 8.7 of the Supplemental Scope of Services.

1. Thoroughly prepare coordination drawings, as further stipulated in Part 3 "Execution", reviewing all contract documents and consulting with all entities contributing to or involved with each portion of the work under consideration.

a. Show the relationship of all components shown on any separate Shop Drawings.

b. Indicate required desired installation sequences.

c. Comply with requirements contained in Division 01 Section 01 33 00 "Submittal Procedures".

2. Prepare coordination drawings for installation of all products and materials fabricated by separate entities.

3. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components, including but not limited to: all site-utility entry points; all ceiling and roof cavities in all areas; all electrical, telecommunications and mechanical rooms; all data rooms; all conference rooms and training rooms; and all such other conditions required to coordinate the work.

4. Prepare a Site Logistics Plan(s) showing: The entire project area and limits; all routes into and out of site; all staging and stockpiling and lay-down areas; all aspects of phasing/staging; all parking, paving and fencing; and all specific provisions to satisfy requirements of Division 01 Sections, including but not limited to Field Engineering and Temporary Facilities and Controls. The Site Logistics Plan shall coincide with and complement the general staging plans and site plans outlined in the contract bidding documents. It is intended that the General Construction Manager shall present this refined plan for approval by the CT DOT Project Manager. The fencing shown on this plan is required for all phases. Exact placement and timing of installations and removals will be reviewed and approved by the CT DOT Project Manager prior to implementation. An additional allotment of various fencing is specified in Division 32, which the Construction Manager shall provide, install, and relocate at various intervals, for installation and removal by the General Construction Manager per the direction of the project's CT DOT Project Manager. This staging and logistics plan will require refinement and change for each phase/stage of the project. The Site Logistics Plan(s) shall be drawn at a scale no smaller than 1"=40' and shall be submitted as stipulated in Division 01 Section 01 29 76 "Progress Payment Procedures", but in no case later than (30) days after Notice to Proceed.

5. Prepare coordination drawings showing locations of surface recesses and voids, as well as offsets and breaks, requiring filling and/or feathering, both those initially visible and those discovered during the course of work. Review with Owner and CTDOT PM to obtain direction for filling and feathering. Revise drawing(s) to record directions for same for field and record purposes.

B. Staff Names: Prior to the contract start date, submit a list of the Construction Manager's principal staff assignments, including the superintendent, project safety officer, and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and at each temporary telephone.

2. Provide resumes of each staff member proposed for the Project. This shall include the Project Manager, Project Superintendent and Safety Officer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed and coordinate such inspections with the CT DOT Project Manager and authorities having jurisdictions. If

unsatisfactory conditions exist notify the CT DOT Project Manager immediately. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. The Construction Manager shall coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

C. Coordination Drawings: Before construction work can begin, the Construction Manager shall submit to the CTDOT PM coordination drawings in the form of (a) reproducible (vellum) transparencies at not less than 1/4-inch scale and (b) REVIT models and PDFs of sheets of the coordination drawings on CDROM. Such drawings will be required throughout all areas for trades as described below. These drawings shall show resolutions of trade conflicts in congested areas. The Engineer will supply base drawings, including floor plans, reflected ceiling plans, and structural framing plans, in the form of REVIT models on CDROM, using the release edition specified with the files, to the Construction Manager for distribution to the trades for use in developing the coordination drawings. Each trade contractor shall within the models show the work of their trade. Prepare coordination drawings as follows:

1. The HVAC trade contractor shall initiate models showing ducts and piping in plan and section. Sheet metal shop drawings must be approved prior to starting coordination drawings.

2. The Sprinkler trade contractor shall then superimpose his piping layout on the coordination drawings and REVIT models.

3. The Electrical trade contractor shall then superimpose all the electrical information on the coordination drawings and REVIT models. Said information is to include but not necessarily be limited to cable trays, equipment, lighting, conduits, bus duct, etc. Show space allowances reserved for work under other contracts, such as audio-visual wiring and equipment.

4. The Plumbing trade contractor shall then complete the coordination drawing by drawing his piping (including pitch) on the coordination drawings.

5. Contractors for specialties, furnishings, equipment and special construction shall add layers to show their work to assure full coordination of all systems.

6. The CT DOT Project Manager shall review the completed coordination drawings and REVIT models for general compliance and then submit them to the Engineer for his review. All trade contractors shall rework the drawings and REVIT models until all systems are properly coordinated.

7. The Ceiling trade contractor shall utilize the drawings and REVIT models to prepare acoustic panel ceiling drawings and any other suspended ceiling drawings, and shall indicate areas of conflict with the work of other trades by drafting the location of grids, panels and tiles.

8. The General Construction Contractor shall indicate Architectural/Structural conflicts or obstacles and coordinate to suit the overall construction schedule. The General Construction Contractor shall locate all precut and prefabricated holes and openings in structural steel on the CAD coordination drawing files as required for HVAC, plumbing, fire protection and electrical work. The Construction Manager shall coordinate these holes and openings with the structural steel fabricator during the structural steel shop drawing development phase. Coordination to take place on schedule so as to permit shop fabrication of all structural steel holes and openings. The Owner will not be held responsible for the costs associated with field fabrication of structural openings resulting from the lack of timely and thorough coordination.

9. The Construction Manager shall expedite all drawing and REVIT model work and coordinate to suit the construction schedule. The Construction Manager shall then review these drawings and models and compare them with the Architectural, Structural, Equipment, and other drawings and determine that all of the work can be installed without undue interference. Prior to the submittal to the Engineer, areas of potential conflict shall be brought to the attention of the Construction Manager who shall convene a coordination meeting of all parties involved, for the purpose of resolving all utility conflicts. The Construction Manager shall supervise and direct corrective measures and have all trades sign acceptance of the drawings. Submit four (4) hard copies of each drawing to the Engineer and two (2) copies to the CT DOT Project Manager for the record, and only after all conflicts have been accommodated.

10. If the coordination meeting fails to resolve coordination conflicts, the Construction Manager shall indicate the nature of such conflicts in a detailed RFI, proposing the most economical solution.

11. The Construction Manager shall not permit work by trades to proceed in a given bay or area until all trade foremen agree on the exact arrangements for each room or area. If a given trade proceeds prior to trades approval, then if necessary, that trade shall revise their work, if necessary, at no extra cost, in order to permit other trades to proceed.

12. Submit all coordination drawings and REVIT models on CD-ROM, in addition to hard copy.

D. The CT DOT Project Manager will meet with the General Construction Contractor and Construction Manager on all major items of coordination.

3.2 CLEANING AND PROTECTION

A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering, where required, to assure protection from damage or deterioration.

B. Clean and provide maintenance on completed construction as construction per manufacturers requirements through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.

2. Excessive internal or external pressures.

3. Excessively high or low temperatures.

4. Thermal shock.

5. Excessively high or low humidity.

6. Air contamination or pollution.

7. Water or ice.

8. Solvents.

9. Chemicals.

10. Light.

11. Radiation.

12. Puncture.

13. Abrasion.

14. Heavy traffic.

15. Soiling, staining, and corrosion.

16. Bacteria.

17. Rodent and insect infestation.

18. Combustion.

19. Electrical current.

20. High-speed operation.

21. Improper lubrication.

22. Unusual wear or other misuse.

23. Contact between incompatible materials.

24. Destructive testing.

25. Misalignment.

26. Excessive weathering.

27. Unprotected storage.

28. Improper shipping or handling.

29. Theft.

30. Vandalism.

3.3 NOTICE TO CONTRACTOR - PROCUREMENT OF MATERIALS

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

END OF SECTION 01 31 00

SECTION 01 31 19 PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Start Date meeting (establishes start date)
2. Pre-construction conferences.
3. Pre-installation conferences.
4. Progress meetings.
5. Safety
6. Coordination
7. As-Built REVIT model and As-Built drawings review

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 31 00 "Project Management and Coordination" for procedures for coordinating project meetings with other construction activities.
2. Division 01 Section 01 32 16.13 "CPM Schedules" for requirements for CPM scheduling and reporting progress of work.
3. Division 01 Section 01 33 00 "Submittal Procedures" for submitting the Construction Schedule or CPM Schedule.
4. Division 01 Section 01 33 00.13 Document Control for requirements related submissions and the use of the Primavera Construction Manager.
5. Division 01 Section 01 35 26 “Government Safety Requirements specifies the requirements for safety plans, reports, and investigation submittals.
6. Division 07 Section 07 54 00 "Thermoplastic Membrane Roofing" for pre-construction conferences.

1.3 PRE-CONSTRUCTION CONFERENCE

A. The Contractor will attend a pre-construction conference before starting construction, as scheduled by the CT DOT Project Manager convenient to the Owner, the CT DOT Project Manager, Engineer, and Contractor. This meeting will take place at least **fourteen (14)** days prior to official Start Date. Hold the conference at the Project Site or another convenient location as directed by the CT DOT Project Manager. The CT DOT Project Manager shall conduct the Pre-construction Conference to review the Contractor and Trade Contractor responsibilities and personnel assignments.

B. Attendees: Authorized representatives of the CT DOT Project Manager, Owner, Engineer, and their consultants; the Contractor and its superintendent; major trade contractors; agency; and other

concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress, including the following:

1. Tentative construction schedule.

2. Critical work sequencing.

3. Progress meeting schedule.

4. Designation of responsible personnel.

5. Procedures for processing field decisions and Change Orders.

6. Procedures for processing Applications for Payment.

7. Distribution of Contract Documents.

8. Submittal of Shop Drawings, Product Data, and Samples.

9. Preparation of record documents.

10. Use of the premises.

11. Parking availability.

12. Office, work, and storage areas.

13. Equipment deliveries and priorities.

14. Safety procedures.

15. First aid.

16. Security.

17. Housekeeping.

18. Working hours.

19. Coordination with Security and Telecommunications Systems.

1.4 PRE-INSTALLATION/CONSTRUCTION CONFERENCES

A. The Contractor will schedule a pre-installation conference(s) at the Project Site before each construction activity that requires coordination with other construction. The Contractor shall be responsible to notify in writing the CT DOT Project Manager and the appropriate Trade Contractor(s), etc., of the date and time of all Pre-installation/Construction Conferences. Notification shall be at least seven (7) days, prior to the Conference. The Contractor shall be responsible for coordination and attendance of all Trade Contractors, etc., involved in or affected by the installation for all Pre-installation/Construction Conferences.

B. Attendees: The CT DOT Project Manager, Contractor, Trade Contractors, Owner and Engineer, the installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. The Contractor shall advise all attendees of the scheduled Pre-installation/Construction Conferences dates.

C. Review the progress of other construction activities and preparations for the particular activity under consideration at each Pre-installation/Construction Conference, including but not limited to the following requirements:

1. Contract Documents.

2. Options.

3. Related Change Orders.

4. Purchases.

5. Deliveries.

6. Shop Drawings, Product Data, and quality-control samples.

7. Review of mockups.

8. Possible conflicts.

9. Compatibility problems.

10. Time schedules.

11. Weather limitations.

12. Manufacturer's recommendations.

13. Warranty requirements.

14. Compatibility of materials.

15. Acceptability of substrates.

16. Temporary facilities.

17. Space and access limitations.

18. Governing regulations.

19. Safety.

20. Inspecting and testing requirements.

21. Required performance results.

22. Recording requirements.

23. Protection.

D. The CT DOT Project Manager will record significant discussions and agreements and disagreements of each Pre-installation/Construction Conference, and the approved schedule. The CT DOT Project Manager will promptly distribute the record of the Pre-installation/Construction Conference to all attendees.

E. The Contractor shall not proceed with the installation/construction if the conference cannot be successfully concluded. The Contractor shall be responsible to initiate whatever actions are necessary to resolve impediments to performance of Work and schedule and reconvene another Pre-installation/Construction Conference at the earliest feasible date. Failure of the contractor to resolve impediments to the performance of the work will not result in an extension of days.

1.5 PROGRESS MEETINGS

A. The CT DOT Project Manager will conduct progress meetings, bi-weekly, at the Project Site or at regular intervals as agreed upon at the Pre-construction Conference. The CT DOT Project Manager will notify the Owner, the Engineer, and the Contractor of the scheduled Progress Meeting dates. Coordinate dates of Progress Meetings with preparation of Application for Payment requests.

B. **Attendees:** In addition to representatives of the Contractor, CT DOT Project Manager, Owner and the Engineer, trade contractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities may be requested to attend these meetings on an as needed basis. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work. The Contractor shall include the site superintendent as a minimum.

C. **Agenda:** Progress Meetings shall review and correct or approve minutes of the previous Progress Meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.

1. **Construction Schedule or CPM Schedule:** Review progress since the last Progress Meeting. Determine where each activity is in relation to the required Contractor's "Construction Schedule" or "CPM Schedule" and whether each activity is on time or ahead or behind Schedule. Determine how Work that is behind Schedule will be expedited; secure commitments from parties involved to do so. Discuss whether Schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
2. Review the present and future needs of each entity present, including the following:
   a. Interface requirements.
   b. Time.
   c. Sequences.
   d. Status of submittals.
   e. Deliveries.
   f. Off-site fabrication problems.
   g. Access.
   h. Site utilization.
   i. Temporary facilities and services.
   j. Hours of work.
   k. Hazards and risks.
   l. Housekeeping.
   m. Quality and work standards.
   n. Change Orders.
   o. Documentation of information for payment requests.

D. **Reporting:** The CT DOT Project Manager will distribute minutes of the meeting to each party present, promptly and before the next scheduled meeting, and to parties who should have been present.

1.6 TRADE CONTRACTOR/COORDINATION/SAFETY MEETINGS

A. The Contractor shall conduct Trade Contractor/coordination meetings.

B. The Contractor shall conduct a separate safety meeting after the safety plan is submitted. The Contractor shall take meeting minutes. These minutes shall be made available upon request. The Contractor shall notify the CT DOT Project Manager of the times and dates of these meetings, who may elect to attend these meetings as an observer when necessary. A minimum of one safety meeting will be held per month.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 31 19

SECTION 01 32 16.13 CPM SCHEDULES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the preparation, submittal, and maintenance of the Contractor's computerized progress schedule, reporting progress of the Work, and Contract time adjustments, including the following:

1. Preliminary schedule.

2. Baseline schedule.

3. Two (2) week look ahead schedules.

4. Schedule revisions.

5. Recovery schedules.

6. Narratives.

7. Schedule time extensions.

B. The above listed Project schedules shall be used for evaluating all issues related to time for this Contract. The Project schedules shall be updated in accordance with the requirements of this Section to reflect the actual progress of the Work and the Contractor's current plan for the timely completion of the Work. The Project schedules shall be used by the Owner and Contractor for the following purposes as well as any other purpose where the issue of time is relevant:

1. To communicate to the Owner the Contractor's current plan for carrying out the Work;

2. To identify work paths that are critical to the timely completion of the Work;

3. To identify upcoming activities on the Critical Path(s);

4. To evaluate the best course of action for mitigating the impact of unforeseen events;

5. As the basis for analyzing the time impact of changes in the Work;

6. As a reference in determining the cost associated with increases or decreases in the Work;

7. To identify when submittals will be submitted to the Owner;

8. To prioritize the Owner's review of submittals;

9. To document the actual progress of the Work;

10. To evaluate resource requirements of the Contractor and the Owner;

11. To integrate the Work with the operational requirements of the Owner's facilities;

12. To facilitate efforts to complete the Work in a timely manner.

13. To document the history of the Work.

C. Refer to the General Conditions and the Agreement for definitions and specific dates of Contract Time.

D. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 11 00 "Summary of Work" specifies the scope of work for the various phases, requirements regarding the Contractor's use of premises, occupancy requirements, products ordered in advance, and Owner furnished products.

2. Division 01 Section 01 25 00 "Substitution Procedures" specifies requirements for handling requests for equals and substitutions.

3. Division 01 Section 01 26 00 "Contract Modification Procedures" specifies requirements for handling and processing contract modifications.

4. Division 01 Section 01 29 76 "Progress Payment Procedures" specifies requirements for submitting Schedule of Values and Application for Payments.

5. Division 01 Section 01 31 00 "Project Management and Coordination" specifies requirements for coordinating construction operations.

6. Division 01 Section 01 33 00 "Submittal Procedures" specifies requirements for submitting the monthly computerized progress schedule.

7. Division 01 Section 01 33 00.13 Document Control for requirements related submissions and the use of the Primavera Construction Manager.

8. Division 01 Section 01 45 00 "Quality Control" specifies requirements for submitting inspection and test reports.

9. Division 01 Section 01 50 00 "Temporary Facilities and Controls" specifies requirements for temporary utilities, support facilities, and security protection.

10. Division 01 Section 01 60 00 "Product Requirements" specifies requirements for submitting the list of products.

11. Division 01 Section 01 77 00 "Closeout Procedures" specifies requirements for Contract closeout.

1.3 DEFINITIONS

A. Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships and network calculations determine when activities can be performed and the critical path of the Project.

B. Critical Path: The longest continuous chain of activities through the network at a given data date for the Schedule to a Contract Milestone or Contract Completion. Where the path to a specific Milestone has become negative, the Critical Path shall be the longest continuous chain of activities with the greatest amount of negative float.

C. Near Critical Path: Any continuous series of activities through the network to the Contract Milestone or the Contract Completion Date where the Total Float of the activity at the data date along that path is within **fifteen (15) days** of the Total Float possessed by the activity at the data date along the Critical Path.

D. Network Diagram: A graphic diagram of a network schedule, showing the activities and activity relationships.

E. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path.

2. Predecessor activity is an activity that must be completed before a given activity can be started.

F. Event: An event is the starting or ending point of an activity.

G. Milestone: A key or critical point in time for reference or measurement.

H. Float: Is the measure of leeway in activity performance. Accumulative float time belongs to the Owner.

1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.

2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned project completion date.

I. Total Float: The number of days from the late finish date (LF) to the early finish date (EF) of an activity at a given data date for the Schedule. When the LF is later than the EF, the Total Float shall be positive. When the LF and the EF are the same, the Total Float shall be zero. When the LF is earlier than the EF, the Total Float shall be negative. Unless otherwise specified all references to "float" shall mean "Total Float."

J. Fragnet: The sequence of new activities and/or activity revisions, logic or resource changes that are proposed to be added to the existing schedule to demonstrate the influence of impacts to the schedule. The Fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities.

1.4 QUALITY ASSURANCE

A. Construction Scheduler:

1. The Contractor is required to employ or retain the services of an individual skilled in construction scheduling ("Construction Scheduler"). For projects with a Contract value greater than five (5) million dollars, the Construction Scheduler shall have at least five (5) years of verifiable experience as the person primarily responsible for preparing and maintaining detailed project schedules on projects of the same or similar size and nature as this project. The Construction Scheduler is required to attend meetings pertaining to scheduling and progress of the work including all progress meetings.

2. Within **five (5) days** after the Notice of Award, the Contractor shall provide a statement to the Owner with the following:

a. Identification, qualifications, and experience of the Contractor's Construction Scheduler and all other members of the Contractor's scheduling staff.

b. References of not less than **two (2)** previous projects on which the Contractor's Construction Scheduler has utilized CPM scheduling.

3. The Owner reserves the right to disapprove any Construction Scheduler candidate proposed for the project and/or remove, without rights to work on the project, any member of the Contractor's scheduling staff that is, in the Owner's opinion, not qualified. In case of disapproval, the Contractor shall resubmit the qualifications and references of the proposed alternate Construction Scheduler within **ten (10) days**. The Contractor must have its Construction Scheduler approved prior to the issuance of the Notice to Proceed and the submission of any schedule.

4. Should the Construction Scheduler leave the employ of the Contractor or be re-assigned or relieved of his/her responsibilities as the Construction Scheduler on the project, the Contractor will be required to submit the qualifications of the proposed replacement Construction Scheduler within **10 days** after the date the former Construction Scheduler is no longer responsible for his/her duties on this Project.

B. Scheduling Software:

1. For Contracts greater than **five (5) million** dollars, the Contractor shall use the latest version of **Primavera Project Planner** as the scheduling software system for use on this Project.

1.5 CPM SCHEDULE FORMAT/CONTENT

A. Format: All Schedules required by this section shall be computer generated, critical path method (CPM) networks utilizing the precedence diagram method of scheduling.

B. Electronic Schedule Naming: The Contractor shall not submit any two (2) schedule files with the same file name. File names shall be in accordance with the following requirements:

1. Proposed/Final Preliminary Schedules shall be named P001, P002, P003, etc.

2. Proposed/Final Baseline Schedules shall be named B001, B002, B003, etc.

3. Final Updated Schedules shall be named U001, U002, U003, etc. Any revisions that are required at a particular update on a data date shall be numbered UA01, UB01, UC01, etc.

C. Activity Identification: Each activity in the Project schedules shall have an activity Identifier (activity ID). The Contractor is encouraged to utilize the activity ID to contain a structure enabling easy identification of work type, location, trade contractor, etc. The activity ID of an existing activity shall not be modified or assigned to another activity.

D. Activity Description: The activity description shall identify the scope of the activity and shall include a verb or work function (i.e. form, pour, execute, etc.), an object (i.e. slab, footing, wall, etc.), and location (i.e., first floor, roof, etc.). There shall not be any two activities with the same activity description. It shall not be necessary to investigate activity code assignments or logic relationships to identify the scope of an activity. For example, the description "Pour Footing" will not be acceptable. The description "Pour Footing West Wall, Section 2" will be acceptable. The terms "Miscellaneous," "Misc." and other vague adjectives shall not be used in an activity description. The Contractor shall standardize the use of terms and their spelling in all activity descriptions. Abbreviation used in activity descriptions shall be consistent with the abbreviations used throughout the Contract Documents and summarized on the Contract Drawings.

E. Work Activities: The Contractor shall include activities for work in the following list:

1. Mobilization.

2. All required submittals and submittal review.

3. Equipment and materials procurement/fabrication/delivery.

4. Installing/operating temporary heat and utilities.

5. Preliminary testing of equipment, instrumentation and controls.

6. Final testing, including preparation time.

7. Substantial Completion: Substantial completion activity shall meet all requirements set forth in Division 01 Section 01 77 00 "Closeout Procedures".

8. Punch list work.

9. Operation and maintenance training.

10. Demobilization.

11. Final cleaning.

12. Issuance of Certificate of Occupancy.

13. Project Specific Issues (If Warranted).

F. Maximum Activity Durations: The Contractor shall prepare schedule utilizing activity durations in terms of days. Do not exceed **twenty-one (21)** day duration on activities except concrete curing, submittal review and equipment fabrication and deliveries. Where duration of continuous work exceeds **twenty-one (21)** days, subdivide activities by location or other sub-element of the work. At the request of the Owner, the Contractor shall substantiate the need for specific activities having longer durations than stated herein. If the Contractor fails to substantiate this need, then the Contractor shall modify activity durations and the corresponding work scope of the activities to the satisfaction of the Owner.

G. Activity Dates: Early and late start and finish dates of activities shall be calculated for each activity based upon the schedule data date, actual dates, schedule logic, schedule constraints, calendars and original duration or remaining duration, in accordance with the software to calculate incorrect early and late, start and finish dates, the Contractor shall be responsible to identify all such errors and to determine correct dates consistent with the parameters specified in this Section.

H. Activity Predecessors and Successors: Every activity shall have logically assigned predecessors and successors in conformance with the requirements of this Section. Unless otherwise specified, Notice to Proceed shall be the only activity in the Project Schedules without a predecessor. Unless otherwise specified, Acceptance and each Contract Milestone(s) shall be the only activity in the Project Schedules without a successor.

I. Activity Constraints: Activity Constraints can affect activity float calculations and shall not be used unless accepted by the Owner. The imposition of a date constraint on any activity shall only be permitted when the Contractor demonstrates the need for such a constraint to the satisfaction of the Owner.

J. Imposed Project Finish Date: The imposed project finish date shall be the Contract Completion date, or if the Contractor plans an early completion date, the date it plans to complete the Work.

K. Negative Float: Negative float is calculated when the user imposes a finish date or other constraint on the schedule and when an activity can only finish after its late finish date. The Contractor shall remove the imposed finish date and/or constraint causing the negative float when directed to do so by the Owner.

L. Activity Codes: The schedules shall contain activity code classifications and code values. The coding structure shall, at a minimum, include code fields for the following: Phase, Area, Location, Type of Work, Submittal/Procurement, Construction, Responsibility, Original/Extra Work, and **Division. All activities in the schedule must have non-blank values for the required codes.**

M. Calendars: The planning unit for the Work shall be days. The global calendar shall contain all union holidays. The Contractor shall coordinate holidays to be observed with the Owner and incorporate them into the schedule as non-working days. This Calendar shall be a **5-day** work week, Monday through Friday. Every activity shall be assigned a working day calendar based on when the activity is planned to occur and when it is contractually permitted to occur. The Contractor shall define and submit additional working day calendars for acceptance by the Owner that are necessary for completion of work in accordance with the requirements of the Contract Documents. Only Owner defined or Owner accepted working day calendars shall be utilized in the Project Schedules.

N. Logic: The Contractor shall be responsible for developing the logic of the Preliminary, Baseline and Recovery Schedules and for updating that logic each month to accurately reflect

the progress of the Work to-date and the Contractor's current plan for the timely completion of the Work.

1. The following criteria shall form the basis for assembly of the schedule logic:

a. Which activity must be completed before a subsequent activity can be started?

b. Which activities can be done concurrently?

c. Which activities must be started immediately following a completed activity?

d. What major economic facility or manpower restrictions are required for sequencing these activities?

2. All paths through the Project schedules shall proceed in the direction representing the progression of time. Activity lag duration shall not have a negative value unless the Contractor substantiates to the satisfaction of the Owner that this is the best representation of reality. The use of activity lags shall be kept to a minimum. The Contractor shall eliminate lags by creating new activities, when the creation of new activities will perform the same function of the lag and when requested to do so by the Owner.

3. Redundant ties to preceding activities in a sequential series of activities will not be permitted. For example, if activity C is the successor in a finish-start relationship to activity B, and activity B is the successor in a finish-start relationship to activity A, then activity A shall not have a redundant finish-start relationship to activity C. A tie representing a different constraint will not be considered redundant. For example, a logic tie showing that the completion of the work scope of a predecessor is required before the successor can start is different from a logic tie representing a resource limitation and will not be considered redundant.

4. The Contractor is required to use manpower and equipment restraints, separately noted, to optimize and level manpower and equipment requirements. Such resource leveling shall reflect a reasonable plan for accomplishing the Work. The individual activities involved may be sequenced within the limits of the available Total Float. However, when this leveling technique is used in establishing the initial schedule, it shall be reflected in the logic with restraints identified as "restraint for manpower or equipment leveling purposes only." Critical or near Critical Paths resulting from the use of manpower restraints shall be kept to a minimum.

5. All activities with resource restraints shall be supplemented with resource loading information as noted in Paragraph G.

6. The Contractor shall correct all incorrect logic relationships in the Schedule Updates to eliminate any out-of-sequenced logic. The Contractor shall make all changes in the logic or other adjustments found to be incorrect by the Owner.

O. Progress Data: Actual start and finish dates shall not be automatically updated by default mechanisms that may be included in the CPM scheduling software systems. The primary source of actual starts and finishes and period percentage completes shall be by field verification. The Contractor is to insure that progress is based of a current estimate of remaining duration to complete the Work and not the activity percent complete which calculates the remaining duration based on the original estimated duration.

P. Submittals:

1. Each submission that is required by the Contract Documents shall have a corresponding activity, for the preparation and review and approval at the submission. When the

Contractor plans on making a submission in parts, each part of the submission shall have corresponding preparation and review and approval activities.

2. The timing, sequencing and duration of all submitted review and approval activities shall be in accordance with the Contract Documents.

3. All submissions designated "Revise and Resubmit" shall require that the Contractor insert new submittal preparation and review and approved activities with appropriate logic into the schedule.

4. When submittal receives a partial approval and the partial approval is sufficient to enable the commencement of a successor activity, then the original submittal activity shall be broken down into multiple activities as necessary to accurately reflect the logic of the Contractor's current plan.

5. When multiple items are included in a single submittal, the "Review and Approve" activity for the submittal shall be a predecessor to every activity representing the fabrication and delivery of any of the materials.

Q. Delivery Activities: The schedules shall include activities for all fabrication and delivery work except for short lead time items. "Short lead time" shall be defined as a period of fourteen (14) days or less from placement of order to delivery of material to the project site. Activities representing the delivery of materials or equipment for more than **one (1)** installation activity will permitted in accordance with the following conditions.

1. The material delivery activity shall be a predecessor to the first activity representing the installation of the material in each area.

2. When partial deliveries are received and those deliveries are adequate to enable the commencement of some, but not all, successor activities, then the original delivery activity shall be broken down into multiple activities as necessary to accurately reflect the logic of the Contractor's current plan.

R. Inspections/Testing: The Contractor shall include an activity for each inspection and test required by the various officials and agencies, including the Building Inspector, and Fire Marshall. The Contractor shall schedule these activities in accordance with the availability of the corresponding agency/official.

S. Progress Override/Retained Logic: The Contractor shall use retained logic to calculate all schedules required by this section. The use of progress override is not allowed without prior approval of the Owner.

T. Weather Days Allowance: The Contractor shall include as a separate identifiable activity on the Critical Path, and activity labeled "Weather Days Allowance." Insert this activity immediately prior to the substantial completion milestone.

1. The Contractor shall be fully responsible for determining the number of weather delay days to be included in the CPM Schedule. This determination shall be based on the normal anticipated weather for the project location and the nature of the project work. The CPM Schedule shall be based on the contractor's determined weather delay allowance, immediately prior to the Substantial Completion milestone.

2. The <u>minimal</u> allowed duration of the Weather Days Allowance shall be calculated as follows (decimals rounded to nearest whole number):

$$\frac{\textbf{Contract Time } \textit{(Calendar Days)}}{\textbf{365}} \textbf{ multiplied by } \textbf{7} \textbf{ equals } \textbf{Weather Days Allowance } \textit{(Calendar Days)}$$

3. The Contractor shall insert an activity in the Critical Path to reflect weather day occurrences when weather days are experienced and accepted by the Owner. Identify this activity as a weather delay.

4. The Contractor shall reduce duration of Weather Days Allowance activity as weather delays are experienced and inserted into the schedule. Remaining weather days in Weather Day Allowance at completion of project is considered float. Weather delay, when justified, are considered allowable, non compensable.

U. Regulatory/Third Party Approvals: The Contractor shall include activities in its schedule for all approvals required by regulatory agencies or other third parties.

V. Resource Loading: The Contractor shall resource load the schedules when required by this Specification and/or if requested to do so by the Owner. When required, the schedules shall be resource loaded for both the Contractor and all of its trade contractors as detailed below or as otherwise directed by the Owner. The Contractor may propose additional or alternative resource loading for the Owner review and acceptance. Defining a resource shall consist of identifying the resource name, resource description, unit of measure, and calendar assignment.

1. **Labor Resources:** Labor shall refer to all craft labor including foreman. Labor shall be measured in person-days. The labor resource definitions shall be consistent with the trade contractor work scope.

2. **Construction Equipment Resources:** The planned use of equipment requiring a licensed operator shall be reflected in equipment resource assignments to activities.

3. **Limits on Resources:** The Contractor shall indicate in its Narrative the expected amount of resource and shall define the normal or expected usage along with a maximum limit available to the Contractor. Resource limits may vary for different stages of the work. Resource limits shall be revised to reflect the Contractor's current plan for the timely completion of the work.

W. Activity Logs:

1. Activities that are modified or added by change order shall be identified in the activity log. The change order number, as issued by the Owner, and the date the activity was modified or added shall be clearly recorded.

2. Activities affected by logic changes, resource changes, duration changes and calendar changes shall be identified in the activity log. The date the activity was modified, the nature of the change and the reason for the change shall be clearly recorded.

1.6 PRELIMINARY SCHEDULE AND PRELIMINARY SCHEDULE UPDATES

A. For projects with a construction cost estimate over five (5) million dollars, the Contractor shall submit a Preliminary Schedule and Preliminary Schedule Updates. The Notice to Proceed will not be issued and the Contractor will not be allowed to start work at the Project site until the Preliminary Schedule has been submitted and accepted.

B. The Preliminary Schedule shall contain a detailed plan of operations for the first 90 days of Work after receipt of the Notice to Proceed.

C. The CTDOT Project Manager and Construction Manager shall meet after receipt of Preliminary Schedule to review and make necessary adjustments. Contractor shall submit a revise Preliminary Schedule incorporating the adjustments with **five (5) days** after meeting.

D. All Work contemplated beyond the first **ninety (90) days** shall be shown in sufficient detail such that the Critical Path and all Contract Milestones may be identified.

E. The Preliminary Schedule shall be updated monthly during first **ninety (90) days** after issuance of the Notice to Proceed. The first update of the Preliminary Schedule shall show the progress on the actual Notice to Proceed date and shall be submitted to the CTDOT Project Manager within **five (5) days** after the issuance of the Notice to Proceed. Subsequent updates shall show the progress through the last day of the month and shall be submitted to the CTDOT Project Manager by the fifth business day of each month.

F. Preliminary Schedule Update revisions that are required as a result of review comments by the CTDOT Project Manager shall be submitted within **five (5) days** of the Construction Manager's receipt of the CTDOT Project Manager's comments. The data date of the revised Preliminary Schedule Update shall remain on the first day of the month.

G. The Construction Manager shall not be permitted to make any schedule revisions (besides progress) to the Preliminary Schedule Update unless approved by the CTDOT Project Manager. When schedule revisions are required, the Construction Manager shall submit a Schedule Revision per Article 1.11.

1.7 BASELINE SCHEDULE

A. For projects with a construction cost estimate over five (5) million dollars, the Construction Manager shall submit the proposed Baseline Schedule to the CTDOT Project Manager for all the work of the project within forty-**five (45) days** after issuance of the Notice to Proceed. The Accepted Preliminary Schedule shall be incorporated unchanged, as first **ninety (90) days** activity in the Construction Manager's Baseline Schedule.

B. The proposed Baseline Schedule shall show sequence and interdependence of all activities required for complete performance of all Work, beginning with date of Notice to Proceed and concluding with date of final completion of the Contract. The Baseline Schedule shall depict the work as bid and as planned as of the Notice to Proceed. The data date shall be the actual date of the Notice to Proceed.

C. The CTDOT Project Manager and the Construction Manager shall meet after the CTDOT Project Manager's receipt of the Baseline Schedule to review and make necessary adjustments. Should adjustments be required, the Construction Manager shall submit a revised Baseline Schedule within five (5) days after the meeting and receipt of the CTDOT Project Manager's comments. Subsequent follow-up meetings and resubmissions may continue until the CTDOT Project Manager accepts the Baseline Schedule.

D. The Construction Manager shall require each major Trade Contractor and major supplier to submit in writing a statement certifying that the major Trade Contractor or major supplier has concurred with the Construction Manager's Baseline Schedule, the major Trade Contractor's or major supplier's related schedule has been incorporated accurately, including the duration of activities and crew allocations. The definition of a "major Trade Contractor" is **one (1)** that provides services valued in excess of **five (5) percent** of the Contract value. The definition of "major supplier" is **one (1)** that provides material(s) or services valued in excess of **one (1) percent** of the Contract value. Failure of the Construction Manager to provide the required information will delay the approval of the Baseline Schedule.

1.8 SCHEDULE UPDATES

A. The Construction Manager shall update and progress the CPM Schedule through the last day of each month (the Data Date is the first day of the month). Updating and progressing the CPM Schedule shall be completed and submitted by the fifth business day each month. Except as otherwise authorized by the CTDOT Project Manager, monthly submissions received after the due date are considered late.

B. The first update will consist of the approved Baseline Schedule updated as of the first day of the first month which starts after **ninety (90) days** from the Notice to Proceed. Subsequent monthly Schedule Updates will be the previous month's approved Schedule Update or approved Revision Schedule updated to reflect progress over the last month. Schedule revisions, apart from updating the status of the remaining durations and percent completes of the various work activities will not be permitted in the Schedule Update.

C. The Contractor shall create a copy of the previous month Schedule Update for the purpose of updating and progressing it. The schedule shall be updated to show the work actually accomplished during the preceding month, the actual time consumed for each activity, and the estimated time remaining for any activity that has been started but not completed. The updating of the percent complete and the remaining duration of any activity shall be independent functions; program features that calculate one of these parameters from the other shall be disabled.

D. The Construction Manager shall make the necessary adjustments to the Schedule Update in accordance with the CTDOT Project Manager's Schedule Update review comments and shall re-submit the Schedule Update within **five (5) days** after receipt of those comments.

E. The Construction Manager shall prepare the monthly Schedule Updates every month starting on the month described above through the actual substantial completion date.

1.9 TWO-WEEK LOOK AHEAD SCHEDULES

A. The Construction Manager shall be required to produce and submit to the CTDOT Project Manager a Two-Week Look Ahead Schedule, to be updated and submitted the first day of each week. Except as otherwise authorized by the Owner, submissions received after the due date are considered late.

B. The Two-Week Look Ahead Schedule may be a CPM schedule or a bar chart; it shall be consistent with the previously approved Schedule Update or approved Schedule Revision.

1.10 SCHEDULE REVISIONS

A. If, at any time, the Construction Manager alters its logic, original durations, or descriptions, adds activities or activity codes, or in any way modifies the accepted Preliminary Schedule, accepted Preliminary Schedule Update, Baseline Schedule or Schedule Update, the Construction Manager must notify the CTDOT Project Manager of the change(s), in writing and submit a Revision Schedule to the CTDOT Project Manager for review.

B. The preparation and submission of Revision Schedules will also be required to reflect any Contract Modifications that were approved and Construction Change Directives that were issued during the preceding period and any extra or changed work that the Construction Manager has started during the preceding period.

C. With each Revision Schedule, the Construction Manager shall submit a written narrative explaining the nature of the change(s), the schedule, the reason for the change(s) and the impact on the schedule as a result of the change(s).

D. All changes (i.e. duration changes, logic changes, new logic, new or modified activities changes in work sequence, etc.) shall be recorded and a note added to the activity log. The record shall include at a minimum, the date and the reason for the change, and description of the change.

E. The required Revisions Schedules and Narratives are in addition to the regular Schedule Update. They shall be separate submittals and shall be noted as Schedule Revisions.

F. Proposed Revision Schedules shall be submitted by the fifth day of the month and shall reflect status as of the first day of the month.

G. The CTDOT Project Manager and Construction Manager shall meet after the CTDOT Project Manager's receipt of the Revision Schedule and Narrative to review and make necessary adjustments. Should adjustments be required, the Construction Manager shall submit a revised Revision Schedule to the CTDOT Project Manager within **five (5) days** after the meeting and receipt of the CTDOT Project Manager Comments. Subsequent follow-up meetings and resubmissions may continue until after the CTDOT Project Manager accepts the Revision Schedule.

H. Only upon acceptance of a revision to the Schedule by the CTDOT Project Manager shall the revision be reflected in the next Schedule Update and Two-Week Look-Ahead Schedule.

I. The CTDOT Project Manager reserves the right to accept or reject any schedule revisions proposed by the Construction Manager.

1.11 RECOVERY SCHEDULES

A. If, in opinion of the Owner, a Schedule Update indicates that the Construction Manager has fallen behind schedule, or that a revision in sequence or operations may be necessary for any other reason, the Construction Manager shall within **seven (7) days** of receiving a written request to perform "Recovery" from the CTDOT Project Manager, immediately institute all necessary steps to improve his progress and shall submit such revised network diagrams, tabulations, operational plans and any supplementary information, as may be deemed necessary by the Owner, to demonstrate the manner in which an acceptance rate of progress will be regained.

B. Should the Construction Manager's "Recovery" efforts not demonstrate an ability to regain an acceptable rate of progress, the CTDOT Project Manager may require the development of a "Recovery Schedule" and the Construction Manager shall submit the Recovery Schedule within **twenty-one (21)** days of receiving a written request for the Recovery Schedule from the CTDOT Project Manager. The Recovery Schedule is to be supplemented with resource allocations for every task activity and include time-scaled resource histograms. The resource allocations shall be shown to a level of detail that facilitates report generations based on labor crafts and equipment classes for the Construction Manager and Trade Contractors. The Construction Manager shall use average composite crews to display the labor loading of onsite construction activities. The Construction Manager shall optimize and level labor to reflect a reasonable plan for accomplishing the Work of the Contract and to assure that resources are not over allocated in multiple concurrent activities. The time-scaled resource histograms shall show labor crafts and equipment classes to be utilized on the Contract.

C. In addition to required submittals, the "Recovery Schedule" submission will also include a Narrative as detailed herein, a time-scaled resource histogram and a Monthly Resources Loading Summary Report (tabular) indicating the peak number of resources required for each activity.

D. The CTDOT Project Manager shall be the sole judge as to whether the Recovery Schedule is sufficiently detailed. Upon acceptance of this Recovery Schedule, it shall form the basis of the new Monthly Schedule Updates going forward.

E. No additional compensation will be allowed for Recovery Schedules required to overcome delays caused in whole or in part by the Construction Manager.

1.12 NARRATIVES

A. The Construction Manager shall prepare and submit a Narrative to accompany the Baseline Schedule, Preliminary Schedule and each Preliminary Schedule Update and Monthly Schedule Update. The Narratives shall include:

1. Identification of the update period, the data date and the schedule file name.

2. A description of the current Critical and Near Critical Paths activities that are supposed to start or to be worked on over the coming month.

3. Changes to the Critical Path, intermediate and completion Milestones

4. Description of problem areas.

5. Current or anticipated delays:

a. Cause of delay.

b. Impact of delay on other activities, Milestones, and completion dates.

c. Corrective action and schedule adjustments to correct the delay.

6. A discussion of work completed during the period.

7. A comparison of the planned versus schedule progress early on and near Critical Path activities that were to have been worked on over the last month.

8. A description of any interdependencies between the Construction Manager's Schedule and any work by other Contractors, third parties, and/or the Owner and its representatives.

9. A description of the current status of float created by any previous or ongoing compensable or excusable delays, whether or not the Construction Manager has utilized any of this float over the last period by purposefully slowing down (pacing) and any request to utilize this float over the coming period.

10. An explanation of how adverse weather has been addressed in Schedule and an accounting of the Weather Day Allowance delineating the activities incorporated into the Schedule to account of work days lost due to weather and the resultant decrease in the duration of the Weather Day Allowance.

11. A description of planned labor resources to be utilized to complete critical and near Critical Path work as requested by the CTDOT Project Manager.

12. A description of actual and potential equipment resource limitations.

1.13 NETWORK FILES, GRAPHICAL OUTPUT AND REPORTS

A. With each Preliminary Schedule, Preliminary Schedule Update, Baseline Schedule, Schedule Update, Revision Schedule and Recovery Schedule required by these specifications, the Construction Manager shall submit to the CTDOT Project Manager the following schedule reports/graphics/files:

1. **Three (3)** compact disc sets that each include:

a. A compressed back up of the entire schedule.

b. Gantt charts in Adobe Acrobat PDF file format, formatted to fit ANSI Size D paper (610mm x 914mm) (24" x 36"), and showing the Activity ID, Activity Description, Original Duration, Remaining Duration, Total Float, Early Start and Finish Dates, and Calendar ID. Types of Gantt Charts to be included are:

i. The project critical (longest) path.

ii. The Project near Critical Path (excluding Critical Path activities).

iii. All uncompleted work activities as of the data date.

2. Reports in Adobe Acrobat PDF file format, formatted to fit 216mm x 279mm (8½" x 11") size paper, to include:

a. A listing of all activities, by activity code, with early & late starts and Total Float.

b. A Claim Digger Report that details all changes between the current schedule submittal and the previous month's update submittal.

c. Detailed Predecessor/Successor Report which included a listing of all activities that immediately precede and immediately succeed that activity in the schedule logic.

3. **Three (3)** paper copies of each Gantt Charts in color and report on the paper size specified above.

B. Schedule submittals will only be considered complete when all materials have been submitted.

1.14 FLOAT/CRITICAL PATH

A. With the exception of the Float described in Paragraphs B and C, Float is not for the exclusive use or benefit of either the CTDOT Project Manager or the Construction Manager but is an expiring resource available to all parties acting in good faith as needed to meet any Contract Milestone(s).

B. As float is an expiring resource, if the Work is delayed on the Critical Path due to an excusable delay (either compensable or non-compensable) or by any delay for which responsibility has not yet been agreed upon, the Construction Manager may not use any float created by such delay on any other path without the express written approval of the CTDOT Project Manager or unless at the time of the float consumption a time extension had been issued for the delay that created the float being consumed. Use of such float on any parallel path without the approval of the CTDOT Project Manager shall be construed as a concurrent inexcusable delay to any delay caused by the CTDOT Project Manager.

C. It is acknowledged and agreed by the Construction Manager that CTDOT Project Manager caused delays on the project may be offset by CTDOT Project Manager caused time savings (including, but not limited to: Critical Path submittals returned in less time than allowed for in the Contract, approval of substitution requests which result in a savings of time along the Critical Path for the Construction Manager, etc.). In such an event, the Construction Manager shall not be entitled to receive an extension of time or delay damages until the CTDOT Project Manager caused time savings are exceeded and the Contract completion date also exceeded.

1.15 EARLY COMPLETION

A. Should Construction Manager submit a Preliminary Schedule, Baseline Schedule, Schedule Update or Schedule Revision showing Project Completion more than **twenty (28) days** prior to Contract Completion Date, the CTDOT Project Manager may issue a Change Order, at no cost to Owner, revising the time of performance of Work and Contract completion date to match Construction Manager's schedule. Contract Milestone dates, if any, shall be adjusted accordingly. The assessment of liquidated damages shall be measured based on the new Milestone and Contract completion dates.

B. Should any monthly Schedule Update show the project completion earlier than current Contract completion date, the Construction Manager shall show early completion time as

schedule activity, identified as "Project Float." This float shall be available for use by either party as per the provisions of Article 1.14. The Owner shall not be liable for any damages as a result of utilizing this float.

1.16 CONTRACT TIME EXTENSIONS

A. Mitigation of Delays:

1. The Construction Manager shall be responsible to develop mitigation measures for all delays regardless of responsibility for the delays and to identify all time and cost impacts to the work associated with those mitigation measures. Unless circumstances otherwise require, the Construction Manager shall not pursue mitigation action for which it expects the Owner to be liable prior to notifying the Owner and receiving CTDOT Project Manager authorization to proceed with the mitigation action. Any action taken by the Construction Manager prior to receiving approval from the CTDOT Project Manager shall be at the Construction Manager's risk.

2. When the need for mitigation arises to ensure timely completion, the Construction Manager shall review all uncompleted activities on the Critical and Near Critical Paths to the Contract Completion Date for errors in scope, duration, and logic and for the feasibility of performing in parallel work currently scheduled sequentially.

3. Whenever it is possible for the Construction Manager to mitigate delay without added cost, the Contractor shall do so. The Contractor shall mitigate all delays as efficiently and economically as possible, with the objective of minimizing both the time and cost impact of the delay regardless of responsibility for the delay. The Owner will not be liable for damages which the Contractor could have avoided by reasonable means such as prudent scheduling of the work and judicious handling of forces, equipment or plant. The Owner will not be liable for damages incurred by the Contractor during any period of time when the Contractor has failed to provide notification of delay in accordance with the Contract requirements when having the notification at the specified time could have influenced the Owner's decision or actions.

B. Time Impact Analysis:

1. If the Construction Manager believes that a proposed change will impact the Project Completion Date or interim Milestones, the Contractor shall submit an analysis with its Change Order Proposal demonstrating the delay to the Critical Path. This analysis shall be in the form of a Time Impact Analysis (TIA).

2. The Time Impact Analysis shall consist of: 1) a Fragnet of the portion of the schedule that will be affected by the incorporation of the change, which shall include the new activities, revised logic and durations associated with the proposal change; 2) a narrative explanation of how the proposed change would impact the schedule; 3) an impact schedule which shall be developed by incorporating the Fragnet and required changes, including any delay mitigation measures, into the most recent accepted schedule update and; 4) electronic copies of the Fragnet and impact schedule.

3. The Construction Manager shall submit its TIA in sufficient time to allow it to be incorporated into a Revision Schedule prior to the change order work proceeding, allowing the Owner **thirty (30)** days after receipt of the TIA and all the supporting information required with the Change Order Proposal to approve or reject the analysis.

4. Upon agreement on the schedule impact due to the proposed change and the issuance of a time extension, the Construction Manager shall incorporate the agreed upon Fragnet/schedule revisions in the next monthly update.

5. The Owner reserves the right to have the Construction Manager proceed with the change order related work without agreeing on the time associated with it and to measure the actual schedule impact via Contemporaneous Period Analysis.

6. In cases where the Construction Manager has not submitted a TIA with its Change Order Proposal for a particular proposed change, the Contractor agrees that the particular proposed change has no impact on the Contract Completion Date or interim Milestones and no time extension is required.

C. Contemporaneous Period Analysis:

1. When an accepted Schedule Update indicates the project has been delayed beyond the current Contract Completion Date and the Construction Manager believes it is entitled to an extension of time, the Contractor shall prepare and submit to the Owner a Contemporaneous Period Analysis (CPA) demonstrating the delay(s) to the Critical Path at the time of the delay, mitigation measures taken or proposed by the Contractor and request an extension of time.

2. The Construction Manager's CPA and time extension request shall be submitted prior to the submission of the next Schedule Update.

3. The request shall indicate the amount of time requested, the period when the delay was experienced and an explanation as to the cause of the delay.

4. The CPA shall quantify the delay by comparing the completion dates and Milestone dates on an update by update basis, starting with the update just prior to the delaying event and ending with the update just after the conclusion of the delaying event. Only the accepted schedules/Schedule Updates shall be used in the CPA. The CPA shall determine the cause of the delay by correlating slippage with various unforeseen events.

5. The CPA will consist of: 1) an update by update accounting of all delay(s) during the period in question; 2) an update by update narrative explanation of how the delay(s) affected the completion date or would have affected the completion date but for other concurrent delay(s); 3) chronologies of the issues affecting the schedule period in question; and 4) a day by day accounting and description of the unanticipated work/work stoppage on the Critical Path and/or path in question; 5) a Gantt chart comparing the as-planned schedule just prior to the start of the delay to the actual as-built for the path(s) in question.

D. The Owner may require the Construction Manager to correct errors in its TIA or CPA at anytime, whether or not the schedules have been accepted and/or time extension issued and agreed upon. Should the errors affect the outcome of the TIA or CPA, the Owner reserves the right to adjust the time extension accordingly. Generally, a schedule will be found to be in error if it does not properly reflect the sequencing, timing and durations of all the work and required events as well as mitigation efforts contemplated or which should have been contemplated at the time of the data date of the schedule.

E. Time Extensions will be granted only to the extent that equitable adjustments for the activity or activities affected exceed or exceeded the total or remaining float along the Critical path or activities at the time of the actual delay. Actual delays in activities which do not affect the Critical Path work or which do not move the Construction Manager's planned completion date beyond the Contract completion date or current completion date as affected by previous delays, will not be the basis for an adjustment to the Contract time. Time Extensions shall not be granted until a delay occurs that is:

1. Beyond control of and without fault of or negligence of the Construction Manager and the major Trade Contractors or Suppliers at any time.

2. Extends the actual performance of the work beyond the Contract completion date or other specified Interim Milestones.

E. Should a non-compensable excusable delay be concurrent with one or more compensable delays, the Construction Manager and Owner agree that the net result is a non-compensable, excusable delay to the extent the delay is caused by the non-compensable event.

F. The Construction Manager shall have no claim for damages of any kind, or extensions or increase to the Contract time(s) or Contract Milestone(s), or adjustments of Contract Price on account of any delay, interruption or suspension of the Work or any portion thereof (herein after collectively referred to as "Delay"), due to whatever cause unless the prerequisites of this Subsection are met. The requirements of this Subsection are in addition to and not in lieu of the requirements of any other applicable subsection.

1.17 REVIEW AND ACCEPTANCE OF PROJECT SCHEDULE SUBMITTALS

A. The CTDOT Project Manager shall review schedule submittals for conformance with the requirements of the Contract Documents. Schedule review comments by the CTDOT Project Manager may address whether items of Work are omitted, activity durations are reasonable or that the level of labor, materials, and equipment, the means, methods, timing, and sequencing of the Work are practicable. The planning, scheduling or execution of the Work and the accuracy of any Project Schedule shall remain the sole responsibility of the Construction Manager.

B. During the review of any of the submissions required by this section, if any of the following conditions are discovered the submittal shall be returned by the CTDOT Project Manager without further review for correction and re-submittal:

1. The submittal is incomplete.
2. The submittal does not comply with the specified format.
3. A component of the submittal has not been prepared in accordance with all of the requirements of this section.
4. The quality of the submittal indicates that the Construction Manager has failed to perform an internal quality control review prior to submission.
5. There is an inconsistency between electronic files and printed material.

C. It is the Construction Manager's responsibility to ensure that all Project Schedules are in compliance with all of the requirements of the Contract Documents. The CTDOT Project Manager's failure to return a submittal shall not be construed to mean that the submittal is in compliance with the requirements of the Contract Documents. The CTDOT Project Manager, at its discretion, may choose to complete a submittal review even though the submittal fails to meet one of more of the conditions for rejection stated herein.

D. The acceptance of any Project Schedule by the CTDOT Project Manager does not constitute acceptance or approval of any change to the requirements of the Contract Documents including but not limited to any mandated construction sequences. The CTDOT Project Manager is not responsible for any erroneous assumptions or information in any Project Schedules regardless of origin.

E. The Construction Manager shall be responsible for all delays due to its failure to submit complete submittals in accordance with the requirements of the Contract Documents.

F. The Schedule submitted will not be considered acceptable until all of the CTDOT Project Manager's comments are incorporated into the schedule to the CTDOT Project Manager's satisfaction.

G. Errors in any Project Schedule accepted by the CTDOT Project Manager, including but not limited to activity durations, relationships between activities, resource allocation or other float suppression techniques that do not accurately reflect the work may be identified at any time and once identified shall be corrected by the Construction Manager.

H. CTDOT Project Manager's acceptance of a Schedule Update shall not constitute the approval of a time extension should the Project Completion Date or Contract Milestone(s) be shown as delayed.

I. Notwithstanding any review, review comments, acceptance, scheduling assistance or direction to change and/or revise any schedule by the CTDOT Project Manager, the schedules shall at all times be the Construction Manager's schedule for performing the Work and not be considered as any CTDOT Project Manager direction constituting a change unless the Contractor gives appropriate notice and the other Contract provisions for determining merit and entitlement are met.

1.18 PAYMENT

A. When the Construction Manager submits its schedule of values in accordance with the General Conditions, it shall include an amount for the scheduling work associated with this section, this cost to be paid in accordance with section (01 29 76).

B. Failure of the Construction Manager to submit a Baseline Schedule or Revised Baseline Schedule for any portion of the work in accordance with this specification may result in the withholding all Contract payment until the schedule is submitted to, and accepted for compliance with the specification and reasonableness, by the CTDOT Project Manager.

C. In the event the project extends beyond the original completion date by more than 30 days, and a time extension is granted to the Construction Manager, the CTDOT Project Manager may require additional CPM updates which will be paid at the per month cost for the Scheduling Update services.

1.19 DISTRIBUTION

A. Distribute copies of the computer generated schedules to CTDOT Project Manager, Architect, Owner, Trade contractors, suppliers, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problem anticipated by projections indicated in schedules.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 32 16.13

SECTION 01 32 33 PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for construction photographs and video taping.

B. Related Sections: The following Section contains requirements that relate to construction photographs:

1. Division 01 Section 01 33 00 "Submittal Procedures" specifies general requirements for submitting digital construction photographs.
2. Division 01 Section 01 33 00.13 Document Control for requirements related submissions and the use of the Primavera Construction Manager.

1.3 SUBMITTALS

A. Photographs: Provide a digital camera to take twenty-four (24) or more photos each time. Deliver two (2) sets of photo files on CD-ROM and one (1) set of prints (8x10) to the CT DOT Project Manager for the Department.

1. Extra Sets: When requested by the Owner, the photographer shall prepare extra sets of prints or CD-ROMs. The photographer shall distribute these directly to the designated parties who will pay the costs for the extra sets directly to the photographer.

B. Video Tape: Provide Professional Video Tape of the Owner Training of systems and equipment to the CTDOT Project Manager for the Department.

1.4 QUALITY ASSURANCE

A. Engage a qualified commercial photographer to take photographs during construction.

B. Photographer's Qualifications: Photographer shall be an individual of established reputation who has been regularly engaged as a professional photographer for not less than three (3) years.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC COPIES

A. On the date the work is begun and every thirty (30) days thereafter (until the work is at least 95 percent complete), the Contractor shall have digital photographs of the construction taken by a professional photographer.

B. Identification: Label each CD-ROM with project name and date the photographs were taken. With each submittal provide an applied label, rubber-stamped or index sheet with the following information:

1. Name of the Project.

2. Name and address of the photographer.

3. Name of the Engineer.
4. Name of the Contractor.
5. Date the photographs were taken.
6. Vantage Point: Description of vantage point, in terms of location, direction (by compass point), and elevation or story of construction.

PART 3 – EXECUTION

3.1 PRECONSTRUCTION PHOTOGRAPHS

A. Before starting construction, take digital photos of the site and surrounding properties from different points of view, as selected by the CT DOT Project Manager.

1. Take digital photos in sufficient number to show existing site conditions before starting Work.
2. Take digital photos of adjacent existing buildings either on or adjoining the property in sufficient detail to record accurately the physical conditions at the start of construction.

3.2 PHOTOGRAPHIC REQUIREMENTS

A. Take twenty-four (24) or more digital photographs monthly, coinciding with the cutoff date associated with each Application for Payment. The CT DOT Project Manager shall select the vantage points for each shot to best show the status of construction and progress since the last photos were taken.

B. As the digital photographs are a record of the work progress, they shall be taken each month, whether or not they show work done during the preceding month. Deliver the CD-ROMs and prints within ten (10) days of their taking.

C. Provide and coordinate the use of photographic software to assure that the photos are viewable by all interested parties.

END OF SECTION 01 32 33

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including but not limited to the following:

1. Submittal schedule.

2. Shop Drawings.

3. Product Data.

4. Samples.

5. Quality assurance submittals.

6. Proposed "Substitutions/Equals".

7. Warrantee samples.

8. Coordination Drawings and REVIT models.

9. O & M Manuals

B. Administrative Submittals: Refer to other Division 01 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Permits.

2. Applications for Payment.

3. Performance and payment bonds.

4. Contractor’s construction schedule.

5. Daily construction reports.

6. Construction Photographs.

7. Insurance certificates.

8. List of trade contractors.

9. Trade contractors/Suppliers FEIN number’s and Connecticut tax registration number.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 25 00 "Substitution Procedures" specifies requirements for submittal of requests for equals and substitutions.

2. Division 01 Section 01 29 76 "Progress Payment Procedures" specifies requirements for submittal of the Schedule of Values.

3. Division 01 Section 01 31 00 "Project Management and Coordination" specifies requirements governing preparation and submittal of required Coordination Drawings.

4. Division 01 Section 01 31 19 "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.
5. Division 01 Section 01 32 16.13 "CPM Schedules" for requirements for CPM scheduling and reporting progress of work.
6. Division 01 Section 01 32 33 "Photographic Documentation" specifies requirements for submittal of periodic construction photographs.
7. Division 01 Section 01 33 00.13 “Document Control” for document control and submission requirements.
8. Division 01 Section 01 35 26 “Government Safety Requirements specifies the requirements for safety plans, reports, and investigation submittals.
9. Division 01 Section 01 45 00 "Quality Control" specifies requirements for submittal of inspection and test reports and mockups.
10. Division 01 Section 01 45 23.13 "Testing for Indoor Air Quality (IAQ), Baseline IAQ, and Materials" specifies requirements for submittal of documentation.
11. Division 01 Section 01 77 00 "Closeout Procedures" specifies requirements for submittal of Project Record Documents and warranties at project closeout.
12. Division 01 Section 01 78 30 "Warranties and Bonds".
13. Division 01 Section 01 81 13 "Sustainable Design Requirements" specifies requirements for submittal of documentation required for sustainable design.
14. Division 01 Section 01 91 00 "Commissioning" specifies requirements for submittal of quality assurance documentation related to commissioning.

1.3 DEFINITIONS

A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended and as identified in the Specification Divisions 02 through 49.

1. Preparation of Coordination Drawings is specified in Division 01 Section 01 31 00 "Project Management and Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.

B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.

C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

a. The CT DOT Project Manager reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

b. The CT DOT Project Manager reserves the right to reject incomplete submitted packages.

c. Submit to CT DOT Project Manager sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label, title block or **8-1/2 inches x 11 inches** cover page approved by the CT DOT Project Manager, on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. The minimum number of copies required for each submittal shall be **seven (7)** or as determined otherwise at the pre-construction conference or by the CT DOT Project Manager.

2. Provide a space approximately **4 inches by 5 inches** on the label, beside the title block or on the cover page on Shop Drawings to record the Contractor's review and approval markings and the action taken.

3. Include the following information on the label for processing and recording action taken.

a. **Project Name and State of Connecticut Project Number.**

b. **Submittal Number and Submittal Title.**

c. **Date.**

d. **Name and address of the Engineer, CT DOT Project Manager, and Owner Representative.**

e. **Name and address of the Contractor.**

f. **Name and address of the trade contractor.**

g. **Name and address of the supplier.**

h. **Name of the manufacturer.**

i. **Number and title of appropriate Specification Section.**

j. **Drawing number and detail references, as appropriate.**

k. **Indicate either initial or resubmittal.**

l. **Indicate deviations from Contract Documents.**

m. **Indicate if "equal" or "substitution".**

1.5 SUBMITTAL TRANSMITTAL:

A. Transmittal of Submittals: Unless otherwise stipulated, all submittals requiring review for conformance with the Contract shall be transmitted electronically in accordance with SECTION 01 33 00.13 DOCUMENT CONTROL.

B. Electronic copies of all transmittal letters shall be sent to the Connecticut Department of Transportation Design and Construction representatives as well as Metro-North Railroad.

C. At the time the foregoing submission is made to the Designer, electronic copies of all submittals requiring Metro-North Railroad review for conformance with the Contract shall be routed directly to Metro-North Railroad. The following submittals require Metro-North Railroad approval.

The submittals associated with the specifications listed below, that require Metro-North Railroad review for conformance with the Contract, shall be clearly labeled "Requires Metro-North Review" on the transmittal when submitted electronically. Hard copies of all final approved submittals shall be hand delivered or sent by mail directly to Metro-North Railroad, 50 Union Avenue, 2nd Floor (West), New Haven, CT 06519, Attention: Mr. Jay Patel. Review of the following submittals may take up to 60 days. The Contractor shall bid the project accordingly.

The following submittals require Metro-North Railroad approval:

Specification Sections

CSI SECTION 26 05 19	600 V COPPER WIRE NO. 500 KCMIL
CSI SECTION 26 05 19	600 V COPPER WIRE NO. 250 KCMIL
CSI SECTION 26 05 26	BARE COPPER WIRE NO. 4/0 AWG
CSI SECTION 26 05 33	5" P.V.C. DUCT BANKS – 2 DUCTS
CSI SECTION 26 05 33	5" P.V.C. DUCT BANKS - 4 DUCTS
CSI SECTION 26 05 33	2" P.V.C. DUCT BANKS – 2 DUCTS
CSI SECTION 26 05 33	ELECTRIC HANDHOLE
CSI SECTION 26 05 33	ELECTRIC MANHOLE
CSI SECTION 26 05 33	CONCRETE MANHOLE
CSI SECTION 26 05 13	500 KCMIL, 15 KV, SHIELDED COPPER CABLE
CSI SECTION 26 05 26	BARE COPPER GROUNDING CONDUCTOR (#4/0)
CSI SECTION 26 05 13	MEDIUM-VOLTAGE CABLES
CSI SECTION 26 05 26	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
CSI SECTION 26 12 00	MEDUIM-VOLTAGE TRANSFORMERS
CSI SECTION 26 13 00	MEDIUM-VOLTAGE SWITCHGEAR
CSI SECTION 26 24 16	PANELBOARDS
CSI SECTION 26 32 13	ENGINE GENERATORS
CSI SECTION 26 33 53	STATIC UNINTERRUPTIBLE POWER SUPPLY
CSI SECTION 27 11 00	COMMUNICATIONS EQUIPMENT ROOM FITTINGS
CSI SECTION 28 13 00	ACCESS CONTROL SYSTEM
CSI SECTION 28 23 00	VIDEO SURVEILLANCE SYSTEMS
CSI SECTION 28 31 11	DIGITAL ADDRESSABLE FIRE-ALARM SYSTEM

Operation and Maintenance Manuals:

All Operation and Maintenance Manuals listed in CLOSEOUT DOCUMENTS.

D. At the time the foregoing submission is made to the Engineer, electronic copies of all submittals requiring Commissioning Agent review for conformance with the Contract shall be routed directly to the Commissioning Agent, See Section 01 91 00 for submittals requiring Commissioning Agent approval.

E. At the time the foregoing submission is made to the Engineer electronic copies of all submittals requiring FM Global review for conformance with the Contract shall be sent

directly to FM Global. The following submittals shall be clearly labeled "Requires FM Global Review" on the transmittal when submitted electronically:

CSI SECTION 33 22 00	6" DUCTILE IRON PIPE (WATER MAIN)
CSI SECTION 33 22 00	8" DUCTILE IRON PIPE (WATER MAIN)
CSI SECTION 33 22 00	HYDRANT ASSEMBLY (WATER MAIN)
CSI SECTION 05 40 00	COLD-FORMED METAL FRAMING
CSI SECTION 07 42 64	METAL COMPOSITE MATERIAL WALL PANELS
CSI SECTION 07 54 00	THERMOPLASTIC MEMBRANE ROOFING
CSI SECTION 07 72 00	ROOF ACCESSORIES
CSI SECTION 07 81 00	APPLIED WATERPROOFING
CSI SECTION 07 84 00	FIRESTOPPING
CSI SECTION 08 33 23	OVERHEAD COILING DOORS
CSI SECTION 08 43 13	ALUMINUM FRAMED STOREFRONTS
CSI SECTION 08 80 00	GLAZING
CSI SECTION 21 13 13	AUTOMATIC SPRINKLER SYSTEMS
CSI SECTION 26 32 13	ENGINE GENERATORS
CSI SECTION 26 41 13	LIGHTNING PROTECTION FOR STRUCTURES
CSI SECTION 26 51 00	INTERIOR LIGHTING
CSI SECTION 28 31 11	DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM
CSI SECTION 44 11 16	INDUSTRIAL DUST COLLECTORS

F. Submittals requiring review for conformance with the Contract that shall be electronically submitted directly to the CT DOT Project Manager in lieu of the Designer are listed below. Electronic copies of the transmittal letters shall be sent to the Connecticut Department of Transportation Design representatives and Metro-North Railroad.

Concrete Mix Design Certifications.
Asphalt Mix Design Certifications.
Erosion Control Plan and Materials.
Demolition Plan.
Disposal Plan
Structure erection plans including erection methods and procedures

G. The submittals associated with the specifications listed below, that require United Illuminating review for conformance with the Contract, shall be clearly labeled "Requires United Illuminating Review" on the transmittal when submitted electronically. Review of the following submittals may take up to 60 days. The Contractor shall bid the project accordingly.

<u>Specification Section</u>

CSI SECTION 26 05 13.19	500 KCMIL, 15 KV SHIELDED COPPER CABLE
CSI SECTION 26 13 00	SWITCHGEAR
CSI SECTION 26 05 33	ELECTRIC MANHOLE
CSI SECTION 26 05 26	GROUNDING AND BONDING

Operation and Maintenance Manuals:

All Operation and Maintenance Manuals listed in CLOSEOUT DOCUMENTS.

H. Submittals requiring review for conformance with the Environmental Contract work that shall be electronically submitted directly to the District Engineer in lieu of the Designer are listed below. Electronic copies of the transmittal letters shall be sent to the Manager of State Design.

Health and Safety Plan.
Disposal Plan and Site.
Lead Abatement Plan.

I. 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.

J. Samples: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of choices, submit 4 full sets of the standard and custom choices for the material or product. Where Samples illustrate assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 1 sample (or set, if applicable).

K. Designer's Action: The Designer will return electronic copies marked with action taken and corrections or modifications required.

L. 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.

M. Maintenance Manuals and Warranties – Maintenance manuals and warranties shall be submitted both electronically and in hard copy form. Refer to SECTION 01 77 00 – CLOSEOUT PROCEDURES for further requirements. Maintenance manuals and warranties will not be returned unless they are rejected.

1.6 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report recording the following information concerning events at the site, and submit duplicate copies to the CT DOT Project Manager at weekly intervals:

1. List of trade contractors at the site.

2. Approximate count of personnel at the site.

3. High and low temperatures, general weather conditions.

4. Accidents and unusual events.

5. Meetings and significant decisions.

6. Stoppages, delays, shortages, and losses.

7. Meter readings and similar recordings.

8. List of equipment on site and identify if idle or in use.

9. Orders and requests of governing authorities.

10. Change Orders received, start and end dates.

11. Services connected, disconnected.

12. Equipment or system tests and startups.

13. Partial Completion's, occupancies.

14. Substantial Completion's authorized.

15. Equals or Substitutions approved or rejected.

1.7 SHOP DRAWINGS

A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:

1. Dimensions.

2. Identification of products and materials included by sheet and detail number.

3. Compliance with specified standards.

4. Notation of coordination requirements.

5. Notation of dimensions established by field measurement.

6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least **8-1/2 by 11 inches** but no larger than **22 by 34 inches**.

7. Submit **one (1)** electronic copy. The Contractor's submittal shall identify the specification section and/or drawing number applicable to the submittal.

8. Details shall be large scale and/or full size.

C. The Contractor shall review the Shop Drawings, stamp with his approval, and submit them with reasonable promptness and in orderly sequence so as to cause no delay in his Work or in the Work of any trade contractor. Shop Drawings shall be properly identified as specified for item, material, workmanship, and project number. At the submission, the Contractor shall inform the CT DOT Project Manager, in writing of any deviation in the shop drawings from the requirements of the Contract Documents.

D. The Engineer will review and comment on shop drawings with reasonable promptness so as to cause no delay, but only for conformance with the design concept of the project and with the information given in the Contract Documents. Refer to Article 5 of the General Conditions. Shop Drawings received by the CT DOT Project Manager that indicate insufficient study of drawings and specifications, illegible portions or gross errors, will be rejected outright. Such rejections shall not constitute an acceptable reason for granting the Contractor additional time to perform the work.

E. The Contractor shall make any corrections required by the Engineer and shall resubmit the required number of corrected copies of Shop Drawings until fully reviewed.

F. Upon final review submit **two (2)** prints, same as submitted, for use by the CT DOT Project Manager.

G. The Engineer's review and comments on Shop Drawings shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents.

H. Only final reviewed Shop Drawings are to be used on the Project site.

I. The Work installed shall be reviewed in accordance with the Shop Drawings and the drawings and specifications. Final Review of the Shop Drawings by the Engineer shall constitute acceptance by the State and the Engineer of a variation or departure that is **clearly identified**. If the contractor believes notations made by the A/E increases the value or scope of the CD's, the contractor must provide written notice to the CA within **seven (7)** days of this issue. Final reviewed Shop Drawings shall not replace or be used as a vehicle to issue or incorporate change orders or substitutions. Substitutions shall be submitted in accordance with Division 01 Section 01 25 00 "Substitution Procedures".

1.8 Shop Drawing For Fire Protection Systems

A. Shop drawings for fire protection systems shall comply with all of the requirements in the section above "Shop Drawings". In addition Sprinkler system shop drawings and hydraulic calculations must be stamped by a professional engineer licensed in the state of Connecticut and must include the CT DCS project number. **Two (2)** sets of information [as noted in this Section 01 33 00 SUBMITTAL PROCEDURES] shall be submitted to the State's Insurance Carrier (SIC), and **one (1)** set shall be submitted to the Office of the State Fire Marshal (OSFM):

1. CT Department of Construction Services:
Office of State Fire Marshal
1111 Country Club Road
Middletown, CT 06457
For More information Contact: Terry Brouwer (860) 685-8350

2. State Insurance Carrier (SIC):
FM Global Boston Operations
Plan Review
500 River Ridge Drive
Norwood, MA 02062
Tel: (781) 440-8241 or FAX (781) 440-8742
bostonleadengineer@fmglobal.com

B. Before the shop drawings are submitted to SIC or CT DCS OSFM, the Engineer's fire protection consultant must review the sprinkler design for compliance with the code, CT DCS OSFM, and FM Global requirements.

1. The State Insurance Carrier (SIC) requires **two (2)** weeks prior notice of a sprinkler system acceptance test.

1.9 FM Global Requirements and Review

A. The State Insurance Carrier is FM Global.

State Insurance Carrier (SIC):
FM Global Boston Operations
Plan Review
500 River Ridge Drive
Norwood, MA 02062
Tel: (781) 440-8241
bostonleadengineer@fmglobal.com

B. The exterior envelope of the building including but not limited to walls, windows, doors, roof areas, and supporting hardware shall meet FM Global requirements which are described in Data Sheets published by FM Global. The Contractor shall obtain copies of the Data Sheets, familiarize themselves with the requirements, complete and submit Forms required by FM Global, and design to the current FM Global standards and Data Sheets.

C. For perimeter flashing provide manufacturer's technical data sheets to FM Global.

D. For all roof assemblies, the Contractor shall complete and submit FM Global Form 2688, including Roof Nav assembly number, proposed materials, proposed fastening rates, and insulation thickness. These forms shall be submitted by the Contractor to FM Global before the roof installation begins.

E. Submit hydraulic calculations and specific manufacturer's product data for sprinkler pipe, fittings, valves, sprinklers, and all other fire protection equipment to FM Global.

1.10 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, schedules, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:

a. Manufacturer's printed recommendations.

b. Compliance with trade association standards.

c. Compliance with recognized testing agency standards.

d. Application of testing agency labels and seals.

e. Notation of dimensions verified by field measurement.

f. Notation of coordination requirements.

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

3. **Preliminary Submittal:** Submit a preliminary single copy of Product Data where selection of options is required.

4. **Submittals:** Submit **two (2)** copies of each required submittal; submit **two (2)** copies where required for maintenance manuals. The CT DOT Project Manager will retain **one (1)** and will return the other marked with action taken and corrections or modifications required.

a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

5. **Distribution:** Furnish copies of final submittal to installers, trade contractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

a. Do not proceed with installation until a copy of Product Data is in the Installer's possession.

b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.11 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

1. Store, mount or display Samples on site in the manner to facilitate review of qualities indicated. Prepare Samples to match the Engineer's sample. Include the following:

a. Specification Section number and reference.

b. Generic description of the Sample.

c. Sample source.

d. Product name or name of the manufacturer.

e. Compliance with recognized standards.

f. Availability and delivery time.

2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least **three (3)** multiple units that show approximate limits of the variations.

b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.

d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

3. Preliminary Submittals: Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices, unless otherwise noted in specification section.

a. The Engineer will review and return preliminary submittals with the Engineers notation, indicating selection and other action.

4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit **three (3)** sets. The CT DOT Project Manager will return **one (1)** set marked with the action taken.

5. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.

a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

b. Sample sets may be used to obtain final acceptance of the construction associated with each set.

B. Distribution of Samples: Prepare and distribute additional sets to trade contractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

1. Field samples are full-size examples erected on-site to illustrate finishes, coatings, or finish materials and to establish the Project standard.

a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.12 QUALITY ASSURANCE SUBMITTALS

A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.

1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 01 Section 01 45 00 "Quality Control."

1.13 ENGINEER'S ACTION

A. Except for submittals for the record or information, where action and return is required, the Engineer will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Engineer will stamp each submittal with a uniform, action stamp. The Engineer will mark the stamp appropriately to indicate the action taken, as follows:

1. Final Unrestricted Release: When the Engineer marks a submittal "Conforms", the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

2. Final-But-Restricted Release: When the Engineer marks a submittal "Conforms as Noted", the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Submit corrected copies for record. Final payment depends on that compliance.

3. Returned for Resubmittal: When the Engineer marks a submittal "Rejected", or "Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

a. Do not use, or allow others to use, submittals marked "Rejected, or Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.

4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the CT DOT Project Manager will return the submittal marked "Action Not Required."

C. **Unsolicited Submittals:** The CT DOT Project Manager will discard unsolicited submittals without action.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 33 00

TITLE:	New Haven Rail Yard Facilities Improvements
JOB NAME:	Maintenance of Way Building
LOCATION:	New Haven, CT
CONTRACT NO:	State Project NO. 0301-0124
CONTRACTOR:	

SUBMITTAL REGISTER

									CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
	(a)	(b)	(c)	(d)			(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Line	Activity #	Trans-mittal #	Specification Section	SD #	Submittal Description	Item Submitted	Paragraph #	Classification: GOVT or A/E Revwr	Submit	Approval Needed By	Material Needed By	Action Code	Date Of Action	Date FWD to APPR / Auth Date RCD From CONTR	Date FWD To Other Revwr	Date RCD From Other Revwr	Action Code	Date Of Action	Mailed To CONTR/ Date RCD From APPR Authority	Remarks
1			02 22 26		DVD and inspection logs	will be reviewed to determine if quality of CCTV image is acceptable, and if defects were properly identified and documented.	3.1. B. 1													
2			02 22 26		Modify equipment and/or inspection procedures	to achieve report material of acceptable quality.	3.1. B. 2													
3			02 22 26		Do not commence work prior to approval of report material quality by the Engineer	Upon acceptance; report material shall serve as standard for remaining work	3.1. B. 3													
4			02 22 26		Maintain copy of all inspection documentation	(tapes, databases, and logs) for duration of work and warranty period.	3.1.B.4													
5			02 41 13.33		See Section 01 33 00 SUBMITTAL PROCEDURES and 01 33 00.13 DOCUMENT CONTROL	for submittal requirements for this work.	1.2													
6			03 05 05		See Sections 01 33 00 and 01 33 00.13	Submittal Procedures.	1.4. A													
7			03 05 05		Product Data:	Submit manufacturers' data on manufactured products.	1.4. B													
8			03 05 05		Test Data:	Submit report of tests showing compliance with specified requirements.	1.4. C													
9			03 05 05		Samples:	Submit samples of underslab vapor barrier to be used.	1.4. D													
10			03 05 05		Manufacturer's Installation Instructions:	Indicate installation procedures and interface required with adjacent construction.	1.4. E													
11			03 10 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
12			03 10 00		Product Data:	Provide data on void form materials and installation requirements.	1.4.B													
13			03 10 00		Shop Drawings:	Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.	1.4.C													
14			03 20 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
15			03 20 00		Shop Drawings:	Comply with requirements of ACI SP-66. Include material designations bar schedules, bending diagrams bars, spacing of bars, locations of splices, material designations, placement diagrams, and manufacturer's literature for mechanical connections	1.4.B													
16			03 20 00		Shop Drawings:	Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in Connecticut.	1.4.B.1													
17			03 20 00		Shop Drawings:	Any incidental provisions to the revision of materials furnish in accordance with shop drawings and order lists to make them comply with the requirements of the plans and specifications shall be borne by the Trade Contractor.	1.4.B.2													

TITLE:	New Haven Rail Yard Facilities Improvements
JOB NAME:	Maintenance of Way Building
LOCATION:	New Haven, CT
CONTRACT NO:	State Project NO. 0301-0124
CONTRACTOR:	

SUBMITTAL REGISTER

									CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
	(a)	(b)	(c)	(d)			(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Line	Activity #	Trans-mittal #	Specification Section	SD #	Submittal Description	Item Submitted	Paragraph #	Classification: GOVT or A/E Revwr	Submit	Approval Needed By	Material Needed By	Action Code	Date Of Action	Date FWD to APPR / Auth Date RCD From CONTR	Date FWD To Other Revwr	Date RCD From Other Revwr	Action Code	Date Of Action	Mailed To CONTR/ Date RCD From APPR Authority	Remarks
18			03 20 00		Manufacturer's Certificate:	Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.	1.4.C													
19			03 20 00		Reports:	Submit certified copies of mill test report of reinforcement materials analysis.	1.4.D													
20			03 20 00		Welders' Certificates:	Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.	1.5.B													
21			03 30 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
22			03 30 00		Product Data:	Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.	1.4.B													
23			03 30 00		Mix Design:	Submit proposed concrete mix design.	1.4.C													
24			03 30 00		Mix Design	Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.	1.4.C.1													
25			03 30 00		Mix Design	Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.	1.4.C.2													
26			03 30 00		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:	1.4.D													
27			03 30 00		Material Documentation	The Owner printed on ticket	1.4.D.1													
28			03 30 00		Material Documentation	Name of producer, identification of plant	1.4.D.2													
29			03 30 00		Material Documentation	Date and time of day	1.4.D.3													
30			03 30 00		Material Documentation	Type of material	1.4.D.4													
31			03 30 00		Material Documentation	Cubic yards of material loaded into truck	1.4.D.5													
32			03 30 00		Material Documentation	Project number, purchase order number, name of Trade Contractor (if Trade Contractor other than producer)	1.4.D.6													
33			03 30 00		Material Documentation	Truck number for specific identification of truck	1.4.D.7													
34			03 30 00		Material Documentation	Individual aggregate, cement, water weights and any admixtures shall be printed on plant tickets	1.4.D.8													
35			03 30 00		Material Documentation	Water/cement ratio	1.4.D.9													
36			03 30 00		Material Documentation	Additional water allowance in gallons based on water/cement ratio for mix	1.4.D.10													

TITLE:	New Haven Rail Yard Facilities Improvements
JOB NAME:	Maintenance of Way Building
LOCATION:	New Haven, CT
CONTRACT NO:	State Project NO. 0301-0124
CONTRACTOR:	

SUBMITTAL REGISTER

									CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
	(a)	(b)	(c)	(d)			(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Line	Activity #	Trans-mittal #	Specification Section	SD #	Submittal Description	Item Submitted	Paragraph #	Classification: GOVT or A/E Revwr	Submit	Approval Needed By	Material Needed By	Action Code	Date Of Action	Date FWD to APPR / Auth Date RCD From CONTR	Date FWD To Other Revwr	Date RCD From Other Revwr	Action Code	Date Of Action	Mailed To CONTR/ Date RCD From APPR Authority	Remarks
37			03 30 00		Curing Plan:	The Trade Contractor shall submit to the Engineer, if requested, at least fourteen (14) days prior to the placement of concrete, a detailed curing plan that describes the following:	1.4.E													
38			03 30 00		Curing Plan	The initial and final curing durations.	1.4.E.1													
39			03 30 00		Curing Plan	Equipment and materials to be used for curing concrete and monitoring concrete temperature, where required.	1.4.E.2													
40			03 30 00		Curing Plan	Proposed primary and secondary water and heat sources, if applicable.	1.4.E.3													
41			03 30 00		Warranty:	Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.	1.4.F													
42			03 30 00		Samples:	Submit samples of underslab vapor retarder to be used.	1.4.G													
43			03 30 10		Product Data:	Submit manufacturer's technical bulletins and MSDS on each product	1.5.A													
44			03 30 10		Quality Control		1.5.B													
45			03 30 10		Quality Control	Provide protection plan of surrounding areas and non-cementitious surfaces.	1.5.B.1													
46			03 30 10		Warranties	Submit warranties in accordance with Division 01 - General Requirements of these specifications.	1.6.D													
47			03 36 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
48			03 36 00		Product data	Product data	1.4.B													
49			03 36 00		Product data	Manufacturer's specifications and test data.	1.4.B.1													
50			03 36 00		Product data	Description of product to be provided, including manufacturer's name and product name.	1.4.B.2													
51			03 36 00		Product data	Recommended installation procedures	1.4.B.3													
52			03 36 00		Product data	Technical data sheet giving descriptive data, curing time, and application requirements.	1.4.B.4													
53			03 36 00		Product data	Material Safety Data Sheet (MSDS) and other safety requirements	1.4.B.5													
54			03 36 00		Test Reports:	Test Reports	1.4.C													
55			03 36 00		Test Reports:	Certified test reports, prepared by an independent testing laboratory, confirming compliance with specified performance criteria.	1.4.C.1													
56			04 05 11		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
57			04 05 11		Product Data:	Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.	1.4.B													

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58			04 05 11		Reports:	Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C 1019	1.4.C													
59			04 05 11		Manufacturer's Certificate	Certify that products meet or exceed specified requirements.	1.4.D													
60			04 20.01		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													
61			04 20.01		Product Data:	Provide data for masonry units, reinforcement and anchorage, flashings, and accessories.	1.5.B													
62			04 20.01		Samples:	Submit four samples of prefaced block units to illustrate color, texture, and extremes of color range.	1.5.C													
63			04 20.01		Manufacturer's Certificate	Certify that masonry units meet or exceed specified requirements.	1.5.D													
64			04 20.01		Maintenance Materials	Furnish the following for Owner's use in maintenance of project.	1.5.E													
65			04 20.01		See Section 01 60 00	Product Requirements, for additional provisions.	1.5.E.1													
66			04 20.01		Extra Pre-Faced Units:	50 of each type, size, and color combination.	1.5.E.2													
67			04 27 31		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
68			04 27 31		See Section 01 81 13	Sustainable Design	1.4.B													
69			04 27 31		Product Data	Provide data for masonry units, fabricated wire reinforcement.	1.4.C													
70			04 27 31		Shop Drawings:	Indicate bar sizes, spacings, reinforcement quantities, bending and cutting schedules, reinforcement supporting and spacing devices, and accessories.	1.4.D													
71			04 27 31		Design Data	Indicate required mortar strength, unit assembly strength in each plane, and supporting test data.	1.4.E													
72			04 27 31		Manufacturer's Certificate	Certify that masonry units meet or exceed specified requirements.	1.4.F													
73			05 12 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
74			05 12 00		Shop Drawings	Shop Drawings	1.4.B													
75			05 12 00		Shop Drawings	Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.	1.4.B.1													
76			05 12 00		Shop Drawings	Connections.	1.4.B.2													
77			05 12 00		Shop Drawings	Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.	1.4.B.3													
78			05 12 00		Manufacturer's Mill Certificate	Certify that products meet or exceed specified requirements.	1.4.C													
79			05 12 00		Welders Certificates:	Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.	1.4.D													

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80			05 12 00		Fabricator's Qualification Statement	Provide documentation showing steel fabricator is accredited under IAS AC172.	1.4.E													
81			05 21 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
82			05 21 00		Shop Drawings:	Indicate standard designations, joist coding, configurations, sizes, spacings, cambers, locations of joists, joist leg extensions, bridging, connections, and attachments.	1.4.B													
83			05 21 00		Welders' Certificates:	Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.	1.4.C													
84			05 21 00		Manufacturer's Qualification Statement:	Provide documentation showing steel fabricator is accredited under IAS AC172.	1.4.D													
85			05 31 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
86			05 31 00		Shop Drawings	Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.	1.4.B													
87			05 31 00		Product Data	Provide deck profile characteristics, dimensions, structural properties, and finishes	1.4.C													
88			05 31 00		Certificates	Certify that products furnished meet or exceed specified requirements.	1.4.D													
89			05 31 00		Welders Certificates	Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.	1.4.E													
90			05 31 00		Fabricator's Qualification Statement:	Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.	1.4.F													
91			05 40 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													
92			05 40 00		Product Data	Provide data on standard framing members; describe materials and finish, product criteria, and limitations.	1.5.B													
93			05 40 00		Shop Drawings	Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.	1,5,C													
94			05 40 00		Shop Drawings	Indicate stud layout.	1.5.C.1													
95			05 40 00		Shop Drawings	Provide design engineer's stamp on shop drawings.	1.5.C.2													
96			05 40 00		Shop Drawings	Provide calculations for loadings and stresses of specially fabricated framing, stamped by a Professional Structural Engineer.	1.5.C.3													
97			05 40 00		Shop Drawings	Provide details and calculations for factory-made framing connectors, stamped by a Professional Structural Engineer.	1,5,C,4													

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98			05 50 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
99			05 50 00		See Section 01 81 13	Sustainable Design Requirements	1.4.B													
100			05 50 00		Shop Drawings	Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.	1.4.C													
101			05 50 00		Shop Drawings	Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.	1.4.D													
102			05 50 00		Welders' Certificates	Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.	1.4.E													
103			05 51 00		Section 01 18 13	Sustainable Design Requirements.	1.4.A													
104			05 51 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.B													
105			05 51 00		Shop Drawings and Calculationsfor Sustainable Railings:	Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.	1.4.C													
106			05 51 00		Shop Drawings and Calculationsfor Sustainable Railings:	Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.	1.4.C.1													
107			05 51 00		Shop Drawings and Calculationsfor Sustainable Railings:	Include the structural design engineer's stamp or seal on each sheet of shop drawings and calculations.	1.4.C.2													
108			05 51 00		Welders' Certificates.		1.4.D													
109			05 51 00		Fabricator's Qualification Statement	Provide documentation showing steel fabricator is certified under AISC 201.	1.4.E													
110			05 52 13		Section 01 18 13	Sustainable Design Requirements	1.4.A													
111			05 52 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.B													
112			05 52 13		Shop Drawings and Calculations for Railings and Guardrails:	Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.	1.4.C													
113			05 52 13		Shop Drawings and Calculations for Railings and Guardrails:	Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.	1.4.C.1													
114			05 52 13		Shop Drawings and Calculations for Railings and Guardrails:	Include the structural design engineer's stamp or seal on each sheet of shop drawings and calculations.	1.4.C.2													
115			05 52 13		Welder's Certificates	Welder's Certificates	1.4.D													
116			05 52 13		Fabricator's Qualification Statement	Provide documentation showing steel fabricator is certified under AISC 201.	1.4.E													
117			05 53 05		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													

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118			05 53 05		Shop Drawings	Indicate details of component supports, openings, perimeter construction details, and tolerances.	1.5.B													
119			05 53 05		Manufacturer's Installation Instructions:	Indicate special requirements for opening and perimeter framing.	1.5.C													
120			06 10 00		See Section 01 18 13	Sustainable Design Requirements.	1.3.A													
121			06 10 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.B													
122			06 41 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
123			06 41 00		Shop Drawings	Indicate architectural cabinet construction including notation of all fabrication and finish materials, component profiles, fastening methods, jointing details, and accessories.	1.4.B													
124			06 41 00		Product Data	Provide data for hardware accessories and plastic laminate, to include adhesives.	1.4.C													
125			06 41 00		Samples	Submit samples of proposed finish materials to include plastic laminate and melamine as applicable, 5-inch x 7-inch in size, along with samples of proposed pulls, hinges, shelf standards, drawer glides and locksets demonstrating hardware design, quality and finish.	1.4.D													
126			06 61 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
127			06 61 00		Product Data	Manufacturer's data sheets on each product to be used, including:	1.4.B													
128			06 61 00		Product Data	Preparation instructions and recommendations.	1.4.B.1													
129			06 61 00		Product Data	Storage and handling requirements and recommendations.	1.4.B.2													
130			06 61 00		Product Data	Specimen warranty	1.4.B.3													
131			06 61 00		Shop Drawings	Complete details of materials and installation; combine countertop shop drawings with shop drawings for cabinets and casework specified in other sections.	1.4.C													
132			06 61 00		Selection and Verification Samples	For each finish product specified, provide 4-inch x 4-inch samples of material representing proposed colors, patterns and texture options.	1.4.D													
133			06 61 00		Test Reports	Chemical resistance testing, showing compliance with specified requirements	1.4.E													
134			06 61 00		Sustainability Report	Submit for products containing recycled content to include indoor air quality and other applicable sustainable features, as specified in Section 01 35 15.	1.4.F													

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135			07 05 23		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.6.A													
136			07 05 23		Work Plan	Work Plan	1.6.B													
137			07 05 23		Product Data	Product Data	1.6.C													
138			07 05 23		Product Data	Thermal Imaging Camera	1.6.C.1													
139			07 05 23		Design Data Envelope Surface Area Calculations	Design Data Envelope Surface Area Calculations	1.6.D													
140			07 05 23		Certificates	Certificates	1.6.E													
141			07 05 23		Certificates	Pressure Test Agency	1.6.E.1													
142			07 05 23		Certificates	Thermographer Qualifications	1.6.E.2													
143			07 05 23		Certificates	Test Instruments	1.6.E.3													
144			07 05 23		Certificates	Date Of Last Calibration	1.6.E.4													
145			07 05 23		Test Reports	Test Reports	1.6.F													
146			07 05 23		Test Reports	Pressure Test Procedures	1.6.F.1													
147			07 05 23		Test Reports	Air Leakage Test Report	1.6.F.2													
148			07 05 23		Test Reports	Diagnostic Test Report	1.6.F.3													
149			07 05 23		Test Reports	No later than 14 days after completion of the pressure test, submit 6 copies of an organized report bound in a durable 3-ring binder. The report is to contain a table of contents, an executive summary, an introduction, a results section and a discussion of the results. Submit the Air Leakage Test Report as described in paragraph AIR LEAKAGE TEST REPORT. Submit a diagnostic test report as described in paragraph LOCATING LEAKS BY DIAGNOSTIC TESTING. The diagnostic test report is to include the Thermographic Investigation Report and the Fog Test Report.	1.6.F.4													
150			07 05 23		Test Reports	Submit field data and completed report forms found in the appendices. Use the sample forms, Test Agency Qualification Sheet, Air Leakage Test Form and Air Leakage Test Results Form to summarize the tests for the appropriate building envelope. Submit both electronically populated and field hand filled-in forms.	1.6.F.5													
151			07 05 23		Test Reports	Report Data for Tests	1.6.F.6													
152			07 11 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
153			07 11 13		Product Data	Provide properties of primer, bitumen, and mastics.	1.4.B													
154			07 14 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
155			07 14 00		Product Data	Provide data for membrane.	1.4.B													
156			07 14 00		Certificate	Certify that products meet or exceed specified requirements.	1.4.C													

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157			07 14 00		Warranty	Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer	1.4.D													
158			07 21 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4A													
159			07 21 00		See Section 01 18 13	Sustainable Design Requirements.	1.4.B													
160			07 21 00		Product Data	Provide data on product characteristics, performance criteria, and product limitations.	1.4.C													
161			07 21 00		Manufacturer's Certificate:	Certify that products meet or exceed specified requirements.	1.4.D													
162			07 25 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													
163			07 25 00		Product Data	Product Data	1.5.B													
164			07 25 00		Product Data	Air Barrier System	1.5.B.1													
165			07 25 00		Certificates	Certificates	1.5.C													
166			07 25 00		Certificates	Prior to commencing the Work, submit copies of manufacturers current ISO certification. Membrane, primers, sealants, and adhesives shall be included.	1.5.C.1													
167			07 25 00		additional submittal requirements.	Refer to paragraph 1.7 Quality Assurance	1.5.D													
168			07 25 00		Evidence of evaluation	of Product by the Air Barrier Association of America (ABAA).	1.7.A													
169			07 25 00		Shop drawings	showing locations and extent of air barrier and details of typical conditions.	1.7.B													
170			07 25 00		Manufacturer's technical data sheets	and material safety data sheets for Product and Accessories.	1.7.C													
171			07 25 00		Manufacturer's installation instructions.	Manufacturer's installation instructions.	1.7.D													
172			07 25 00		Manufacturer's Documentation	Manufacturer's documentation of volatile organic compounds (VOC) content for Product and Accessories.	1.7.E													
173			07 25 00		Certification	compatibility by Manufacturer, listing all materials on the Project with which the Product and Accessories may come into contact.	1.7.F													
174			07 25 00		Installer Qualifications:	Installer Qualifications:	1.7.G													
175			07 25 00		Installer Qualifications:	Shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.	1.7.G.1													
176			07 25 00		Installer Qualifications:	Shall be licensed and certified to install Fluid-Applied Membrane Air Barriers by the Air Barrier Association of America (ABAA).	1.7.G.2													
177			07 25 00		Warranties	Minimum five (5) year material warranty.	1.7.H													

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178			07 25 00		Installation	Product shall be installed in accordance with the manufacturer's recommendations and at thickness required for concrete masonry or exterior gypsum sheathing.	1.7.I													
179			07 41 13		Submittals	See Section 01 33 00 -Submittal Requirements and 01 33 00.13 Document Control, for submittal procedures.	1.4.A													
180			07 41 13		Product Data	Product Data: Manufacturer's data sheets on each product to be used, including:	1.4.B													
181			07 41 13		Product Data	Storage and handling requirements and recommendations.	1.4.B.1													
182			07 41 13		Product Data	Installation methods.	1.4.B.2													
183			07 41 13		Product Data	Specimen warranty.	1.4.B.3													
184			07 41 13		Shop Drawings	Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.	1.4.C													
185			07 41 13		Shop Drawings	Show work to be field-fabricated or field-assembled.	1.4.C.1													
186			07 41 13		Shop Drawings	Include structural analysis signed and sealed by qualified structural engineer, indicating conformance of roofing system to specified wind loading conditions, indicated on structural drawings.	1.4.C.2													
187			07 41 13		Selection Samples	Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.	1.4.D													
188			07 41 13		Verification Samples	Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.	1.4.E													
189			07 41 13		Verification Samples	Include typical panel joint in sample.	1.4.E.1													
190			07 41 13		Verification Samples	Include typical fastening detail.	1.4.E.2													
191			07 41 13		Manufacturer Qualification Statement	Manufacturer Qualification Statement: Provide documentation showing metal roof panel fabricator is accredited under IAS AC472.	1.4.F													
192			07 41 13		Test Reports	Test Reports: Indicate compliance of metal roofing system to specified requirements	1.4.G													
193			07 41 13		Warranty	Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.	1.4.H													
194			07 42 13		Preconstruction Submittals	Preconstruction Submittals	1.5.A													

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195			07 42 13		Preconstruction Submittals	Qualification of Manufacturer	1.5.A.1													
196			07 42 13		Preconstruction Submittals	Qualification of Installer	1.5.A.2													
197			07 42 13		Preconstruction Submittals	Qualification of Engineer	1.5.A.3													
198			07 42 13		Shop Drawings	Shop Drawings	1.5.B													
199			07 42 13		Shop Drawings	Fabrication and installation drawings prepared by manufacturer or manufacturer's authorized dealer. Include full elevations showing openings and penetrations. Include details of each condition of installation and attachment. Provide details at a minimum scale 1-1/2-inch per foot of all required trim and extrusions needed for a complete installation. Include spacing, sizing, and material types of fasteners and connections to be used in completed assembly.	1.5.B.1													
200			07 42 13		Shop Drawings	Wall Panel Assemblies	1.5.B.2													
201			07 42 13		Shop Drawings	Flashing and Accessories	1.5.B.3													
202			07 42 13		Shop Drawings	Anchorage Systems	1.5.B.4													
203			07 42 13		Shop Drawings	Closure Materials, including metal closure strips.	1.5.B.5													
204			07 42 13		Shop Drawings	Include data indicating compliance with performance requirements, prepared and signed by qualified professional engineer	1.5.B.6													
205			07 42 13		Shop Drawings	Indicate points of supporting structure that must coordinate with composite wall panel system installation.	1.5.B.7													
206			07 42 13		Product Data	Product Data	1.5.C													
207			07 42 13		Product Data	Submit manufacturer's catalog data for specified products:	1.5.C.1													
208			07 42 13		Product Data	Factory Color Finish	1.5.C.1.a													
209			07 42 13		Product Data	Wall Panel Assemblies	1.5.C.1.b													
210			07 42 13		Product Data	Flashing and Accessories	1.5.C.1.c													
211			07 42 13		Product Data	Integrated Window System	1.5.C.1.d													
212			07 42 13		Product Data	Secondary Metal Framing	1.5.C.1.e													
213			07 42 13		Product Data	Repair Paint	1.5.C.1.f													
214			07 42 13		Product Data	Anchorage systems	1.5.C.1.g													
215			07 42 13		Product Data	Insulation	1.5.C.1.h													
216			07 42 13		Product Data	Flashing Tape	1.5.C.1.i													
217			07 42 13		Product Data	Fasteners	1.5.C.1.j													
218			07 42 13		Samples	Samples	1.5.D													
219			07 42 13		Samples	Wall Panel Assemblies	1.5.D.1													
220			07 42 13		Samples	Sealants	1.5.D.2													
221			07 42 13		Samples	Gaskets	1.5.D.3													

TITLE:	New Haven Rail Yard Facilities Improvements
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222			07 42 13		Samples	Samples for Initial Selection: For each product specified including sealants and gaskets. Submit manufacturer's color charts and chips showing full range of colors.	1.5.D.4													
223			07 42 13		Samples	Samples for Verification: Provide 24-inch section of wall panel showing finishes, horizontal joinery, vertical joint return, injected core material, panel stiffener and anchoring details. Provide 12-inch long pieces of each extruded aluminum trim and gaskets.	1.5.D.5													
224			07 42 13		Design Data	Design Data	1.5.E													
225			07 42 13		Design Data	Calculations	1.5.E.1													
226			07 42 13		Design Data	Wind design analysis	1.5.E.2													
227			07 42 13		Test Reports	Test Reports	1.5.F													
228			07 42 13		Test Reports	Wind load tests	1.5.F.1													
229			07 42 13		Test Reports	Rated Wall Assembly test data	1.5.F.2													
230			07 42 13		Test Reports	Product test reports indicating compliance of products with requirements, from a qualified independent testing agency. Include spacing, sizing, and material types of fasteners and connections as used in tested assembly.	1.5.F.3													
231			07 42 13		Certificates	Certificates	1.5.G													
232			07 42 13		Certificates	Submit certificates for the following items showing conformance with referenced standards contained in this section:	1.5.G.1													
233			07 42 13		Certificates	Fasteners	1.5.G.1.a													
234			07 42 13		Certificates	Repair Paint	1.5.G.1.b													
235			07 42 13		Certificates	Qualification of Manufacturer	1.5.G.2													
236			07 42 13		Certificates	Certify that the manufacturer of the metal wall panel system meets requirements specified under paragraph entitled "Qualification of Manufacturer."	1.5.G.2.a													
237			07 42 13		Certificates	Qualification of Installer	1,5,G,3													
238			07 42 13		Certificates	Certify that the applicator meets requirements specified under paragraph entitled "Qualification of Installation Contractor."	1.5.G.3.a													
239			07 42 13		Certificates	Submit the wall system assembly wind load and fire rating classification listings.	1.5.G.4													
240			07 42 13		Manufacturer's Instructions	Manufacturer's Instructions	1.5.H													
241			07 42 13		Manufacturer's Instructions	Installation of Wall Panels	1.5.H.1													
242			07 42 13		Manufacturer's Field Reports	Manufacturer's Field Reports	1.5.I													
243			07 42 13		Manufacturer's Field Reports	Water-Spray Test	1.5.I.a													
244			07 42 13		Manufacturer's Field Reports	Field Service Report	1.5.I.b													

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245			07 42 13		Closeout Submittals	Closeout Submittals	1.5.J													
246			07 42 13		Closeout Submittals	Warranty	1.5.J.1													
247			07 42 13		Closeout Submittals	Instructions To:	1.5.J.2													
248			07 42 13		Closeout Submittals	Owner	1.5.J.3													
249			07 42 13		Closeout Submittals	Include copies of Material Safety Data Sheets for maintenance/repair materials.	1.5.J.4													
250			07 42 64		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.8.A													
251			07 42 64		See Section 01 18 13	Sustainable Design Requirements.	1.8.B													
252			07 42 64		Product Data	Manufacturer's data sheets for specified products	1.8.C													
253			07 42 64		Shop Drawings	Provide shop drawings prepared by manufacturer or manufacturer's authorized dealer. Include full elevations showing openings and penetrations. Include details of each condition of installation and attachment. Provide details at a minimum scale 1-1/2-inch per foot of all required trim and extrusions needed for a complete installation	1.8.D													
254			07 42 64		Shop Drawings	Include data indicating compliance with performance requirements.	1.8.D.1													
255			07 42 64		Shop Drawings	Indicate points of supporting structure that must coordinate with composite wall panel system installation.	1.8.D.2													
256			07 42 64		Samples for Verification	Provide 24-inch (600 mm) section of wall panel showing finishes, horizontal joinery, vertical joint return, injected core material, panel stiffener and anchoring details. Provide 12-inch (300 mm) long pieces of each extruded aluminum trim and gaskets.	1.8.E													
257			07 42 64		Product Test Reports	Indicating compliance of products with requirements, from a qualified independent testing agency.	1.8.F													
258			07 42 64		Qualification Information	For Installer and Installer's field supervisor.	1.8.G													
259			07 42 64		Manufacturer's warranty	Submit sample warranty.	1.8.H													
260			07 42 64		Maintenance data		1.8.I													
261			07 54 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures.and Document Control	1.5.A													
262			07 54 00		Product Data	Provide data indicating membrane materials, flashing materials, insulation, and fasteners.	1.5.B													
263			07 54 00		Sustainability Submittal	Include testing documentation of solar reflectance index.	1.5.B.1													
264			07 54 00		Specimen Warranty	For approval.	1.5.C													

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265			07 54 00		Shop Drawings	Indicate joint or termination detail conditions, conditions of interface with other materials, and setting plan for tapered insulation.	1.5.D													
266			07 54 00		Manufacturer's Installation Instructions	Indicate membrane seaming precautions and perimeter conditions requiring special attention.	1.5.E													
267			07 54 00		Manufacturer's Certificate	Certify that products meet or exceed specified requirements.	1.5.F													
268			07 54 00		Manufacturer's Field Reports	Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.	1.5.G													
269			07 54 00		Warranty:	Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.	1.5.H													
270			07 62 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1,4,A													
271			07 62 00		Shop Drawings	Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.	1.4.B													
272			07 62 00		Samples	Submit two samples 2-1/2 x 2-1/2 inch in size illustrating metal finish color.	1.4.C													
273			07 72 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
274			07 72 00		Product Data	Manufacturer's data sheets on each product to be used.	1.4.B													
275			07 72 00		Product Data	Preparation instructions and recommendations	1.4.B.1													
276			07 72 00		Product Data	Storage and handling requirements and recommendations.	1.4.B.2													
277			07 72 00		Product Data	Installation methods.	1.4.B.3													
278			07 72 00		Product Data	Maintenance requirements.	1.4.B.4													
279			07 72 00		Shop Drawings	For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.	1.4.C													
280			07 84 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
281			07 84 00		Schedule of Firestopping	List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.	1.3.B													
282			07 84 00		Product Data	Provide data on product characteristics, performance ratings, and limitations.	1.3.C													
283			07 84 00		Sustainability Report	Submit VOC content documentation for all non-preformed materials.	1.3.D													
284			07 84 00		Manufacturer's Installation Instructions	Indicate preparation and installation instructions.	1.3.E													
285			07 84 00		Manufacturer's Certificate:	Certify that products meet or exceed specified requirements.	1.3.F													

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286			07 84 00		Certificate	from authority having jurisdiction indicating approval of materials used.	1.3.G													
287			07 84 00		Qualification	statements for installing mechanics.	1.3.H													
288			07 90 05		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
289			07 90 05		Product Data	Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability	1.3.B													
290			08 11 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
291			08 11 13		Product Data	Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.	1.4.B													
292			08 11 13		Shop Drawings	Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any. Schedules of doors and frames.	1.4.C													
293			08 31 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
294			08 31 00		Product Data	Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.	1.4.B													
295			08 31 00		Shop Drawings	Indicate exact position of all access door units.	1.4.C													
296			08 31 00		Record Documents	Record actual locations of all access units	1.4.D													
297			08 33 23		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
298			08 33 23		Product Data	Provide general construction, component connections and details, electrical equipment.	1.4.B													
299			08 33 23		Shop Drawings	Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details. Include detailed plans, elevations, and required clearances.	1.4.C													
300			08 33 23		Samples	Submit two slats, 6 x 12 inch in size illustrating shape, color and finish texture	1.4.D													
301			08 33 23		Manufacturer's Instructions	Indicate installation sequence and procedures, adjustment and alignment procedures.	1.5.E													
302			08 33 23		Manufacturer's Certificates	Certify products meet or equal specified requirements.	1.4.F													
303			08 33 23		Maintenance Data	Indicate general maintenance requirements and frequency	1.5.G													
304			08 43 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													

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305			08 43 13		Product Data	Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, and door hardware.	1.5.B													
306			08 43 13		Shop Drawings	Indicate system dimensions, framed open and field welding required	1.5.C													
307			08 43 13		Design Data	Provide framing member structural and physical characteristics, dimensional limitations.	1.5.D													
308			08 43 13		Hardware Schedule	Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in the drawings	1.5.E													
309			08 43 13		Samples	Submit two samples of framing, 12 inches in length illustrating finished aluminum surface.	1.5.F													
310			08 43 13		Manufacturer's Certificate	Certify that the products supplied meet or exceed the specified requirements.	1.5.G													
311			08 43 13		Warranty	Submit manufacturer sample warranty	1.5.H													
312			08 33 23		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
313			08 33 23		Product Data	Provide general construction, component connections and details, electrical equipment.	1.4.B													
314			08 33 23		Shop Drawings	Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details. Include detailed plans, elevations, and required clearances	1.4.C													
315			08 33 23		Samples	Submit two slats, 6 x 12 inch in size illustrating shape, color and finish texture	1.4.D													
316			08 33 23		Manufacturer's Instructions	Indicate installation sequence and procedures, adjustment and alignment procedures.	1.4.E													
317			08 33 23		Manufacturer's Certificates	Certify products meet or equal specified requirements	1.4.F													
318					Maintenance Data	Indicate general maintenance requirements and frequency	1.4.G													
319			08 43 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													
320			08 43 13		Product Data	Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, and door hardware	1.5.B													
321			08 43 13		Shop Drawings	Indicate system dimensions, framed open and field welding required	1.5.C													
322			08 43 13		Design Data	Provide framing member structural and physical characteristics, dimensional limitations.	1.5.D													
323			08 43 13		Hardware Schedule	Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in the drawings	1.5.E													

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324			08 43 13		Samples	Submit two samples of framing, 12 inches in length illustrating finished aluminum surface.	1.5.F													
325			08 43 13		Manufacturer's Certificate	Certify that the products supplied meet or exceed the specified requirements.	1.5.G													
326			08 43 13		Warranty	Submit manufacturer sample warranty	1.5.H													
327			08 44 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
328			08 44 13		Product Data	Provide component dimensions, describe components within assembly, anchorage and fasteners, glazing and infill, internal drainage details	14.B													
329			08 44 13		Shop Drawings	Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details.	14.C													
330			08 44 13		Samples	Submit two samples 24 x 24 inches in size illustrating finished aluminum surface, glazing, glazing materials.	14.D													
331			08 44 13		Test Reports	Submit results of full-size mock-up testing. Certified reports of tests previously performed on the same design are acceptable.	14.E													
332			08 44 13		Design Data	Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations; include load calculations at points of attachment to building structure	14.F													
333			08 44 13		Manufacturer's Certificate	Certify that the products supplied meet or exceed the specified requirements.	14.G													
334			08 44 13		Warranty	Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer	14.H													
335			08 62 23		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
336			08 62 23		Product Data	Manufacturer's data sheets on each product to be used, including	1.2.B													
337			08 62 23		Product Data	Preparation instructions and recommendations	1.2.B.1													
338			08 62 23		Product Data	Storage and handling requirements and recommendations	1.2.B.2													
339			08 62 23		Product Data	Installation methods	1.2.B.3													
340			08 62 23		Shop Drawings	Shop Drawings	1.2.C													
341			08 62 23		Test Reports	Independent testing agency reports verifying compliance with specified performance requirements.	1.2.D													
342			08 62 23		Certifications		1.2.E													
343			08 62 23		Certifications	Manufacturer's certification that products supplied meet or exceed specified requirements	1.2.E.1													

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344			08 62 23		Certifications	Installers certification documenting experience	1.2.E.2													
345			08 71 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													
346			08 71 00		Product Data	Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project	1.5.B													
347			08 71 00		Hardware Schedule	Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.	1.5.C													
348			08 71 00		Keying	The Contractor shall provide construction cores only. Final keying shall be performed by MNR.	1.5.D													
349			08 71 00		Manufacturer's Installation Instructions	Indicate special procedures, perimeter conditions requiring special attention.	1.5.E													
350			08 71 00		Warranty	Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer	1.5.F													
351			08 80 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
352			08 80 00		Product Data on Glass Types	Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements	1.3.B													
353			08 80 00		Manufacturer's Certificates	Certify that products meet or exceed specified requirements	1.3.C													
354			08 80 00		Samples	Submit two samples 12 x 12 inch in size of glass units, showing coloration and design.	1.3.D													
355			09 21 16		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
356			09 21 16		Product Data	Provide data on gypsum board, water-resistant gypsum board, cementitious backer board, gypsum sheathing, acoustic insulation, accessories, and joint finishing system	1.4.B													
357			09 22 16		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
358			09 22 16		Product Data	Provide data describing framing member materials and finish, product criteria, load charts, and limitations	1.4.B													
359			09 30 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
360			09 30 00		Product Data	Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.	1.4.B													

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361			09 30 00		Samples	Provide full size samples of tile, minimum of 12" x 12" to illustrate pattern and color variations and provide samples of grout.	1.4.C													
362			09 51 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
363			09 51 00		Shop Drawings	Indicate grid layout and related dimensioning.	1.4.B													
364			09 51 00		Product Data	Provide data on proposed acoustical ceiling panels, perforated metal ceiling panels and suspension system components.	1.4.C													
365			09 51 00		Samples	Submit two samples of each acoustical panel type illustrating material and finish, 4-inch x 4-inch in size.	1.4.D													
366			09 51 00		Samples	Submit two samples each, 12 inches long, of suspension system main runner illustrating material and finish	1.4.E													
367			09 65 00		Product Data	For each type of product indicated	1.4.A													
368					Samples	For each product indicated, in Manufacturer's standard size for each product to represent true texture, pattern and color required	1.4.B													
369			09 68 13		Shop Drawings	Indicate direction of carpet tile installation and transition to alternate floor finish material	1.4.A													
370			09 68 13		Product Data	Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation	1.4.B													
371			09 68 13		Samples	Submit two full size carpet tiles illustrating color and pattern design for each carpet style, pattern and color selected.	1.4.C													
372			09 68 13		VOC Data	ubmit data documenting VOC content of carpet tile and adhesives; copy of current CRI Approved Products Listing is acceptable.	1.4.D													
373			09 68 13		Manufacturer's Installation Instructions	Indicate special procedures	1.4.E													
374			09 68 13		Maintenance Data	Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning	1.4.F													
375			09 68 13		Maintenance Materials	Furnish the following for Owner's use in maintenance of project	1.4.G													
376			09 68 13		Maintenance Materials	See Section 01 60 00 - Product Requirements, for additional provisions	1.4.G.1													
377			09 68 13		Maintenance Materials	Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.	1.4.G.2													
378			09 90 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													

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379			09 90 00		Product Data:	Provide complete list of all products to be used, with the following information for each:	1.4.B													
380			09 90 00		Product Data:	Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").	1.4.B.1													
381			09 90 00		Product Data:	MPI product number (e.g. MPI #47).	1.4.B.2													
382			09 90 00		Product Data:	Cross-reference to specified paint system(s) product is to be used in; include description of each system	1.4.B.3													
383			09 90 00		Samples:	Submit two paper chip samples, 3 x 3 inch in size illustrating range of colors available for each surface finishing product scheduled	1.4.C													
384			09 90 00		Certification	By manufacturer that all paints and coatings comply with VOC limits specified	1.4.D													
385			10 11 01		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
386			10 11 01		Shop Drawings	Provide manufacturer data sheets for each type of markerboard required.	1.4.B													
387			10 11 01		Product Data	Provide technical data for materials specified. Include Material Safety Data Sheets, when applicable	1.4.C													
388			10 11 01		Samples	Provide Manufacturer's color charts	1.4.D													
389			10 11 01		Manufacturer's Instructions:	Provide Manufacturer's installation instructions	1.4.E													
390			10 14 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
391			10 14 00		Product Data	Manufacturer's printed product literature for each type of sign, indicating sign styles, font, finish and color options, locations, overall dimensions of each sign.	1.3.B													
392			10 14 00		Signage Schedule and Detail Drawings	Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.	1.3.C													
393			10 14 00		Signage Schedule and Detail Drawings	When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.	1.3.C.1													
394			10 14 00		Signage Schedule and Detail Drawings	Submit for approval by CTDOT PM prior to fabrication	1.3.C.2													
395			10 14 00		Samples	Submit one sample of each type of sign, full size, illustrating typical quality, workmanship, sign style, font, method of attachment and proposed finishes/colors.	1.3.D													

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396			10 14 00		Selection Samples	Submit two sets of Manufacturer's color selection charts or chips for review. Indicated proposed selections based on finish/color indicated in drawings	1.3.E													
397			10 14 53		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
398			10 14 53		Certificate	A materials certificate is required for materials specified in the specification	1.2.B													
399			10 21 13.16		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
400			10 21 13.16		Shop Drawings	Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.	1.4.B													
401			10 21 13.16		Product Data	Provide data on panel construction, hardware, and accessories.	1.4.C													
402			10 21 13.16		Samples	Submit two samples of partition panels, 4 x 6 inch in size illustrating panel finish, color, and sheen.	1.4.D													
403			10 22 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
404			10 22 13		Product Data	Provide data for screen materials, finishes.	1.4.B													
405			10 22 13		Shop Drawings:	Indicate plan and vertical dimensions, elevations, component details; head, jamb, and sill details; location of doors and hardware. Provide component details, anchorage, type and location of fasteners, and accessories or items required of related work.	1.4.C													
406			10 22 13		Shop Drawings:	Show field measurements on shop drawings.	1.4.C.1													
407			10 22 13		Samples	Submit two panels, 24 x 24 inch in size, illustrating screen material. Submit samples of door hinge and latchset illustrating style, color, and finish.	1.4.D													
408			10 26 01		Product Data	Indicate physical dimensions and anchorage details	1.2.A													
409			10 22 13		Samples	Submit two sections of corner guard, 12 inch long, illustrating component design, configuration, color and finish, as noted on drawings.	1.2.B													
410			10 28 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													
411			10 28 00		Product Data	Provide data on accessories describing size, finish, details of function, attachment methods.	1.5.B													
412			10 44 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
413			10 44 00		Shop Drawings	Indicate cabinet physical dimensions	1.4.B													
414			10 44 00		Product Data	Provide extinguisher operational features	1.4.C													

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415			10 44 00		Manufacturer's Installation Instructions	Indicate special criteria and wall opening coordination requirements	1.4.D													
416			10 44 00		Manufacturer's Certificate	Certify that products meet or exceed specified requirements	1.4.E													
417			10 44 00		Maintenance Data	Include test, refill or recharge schedules and re-certification requirements	1.4.F													
418			10 51 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
419			10 51 00		Product Data	Manufacturer's published data on locker construction, sizes and accessories, preparation instructions, storage and handling instructions, and installation methods	1.3.B													
420			10 51 00		Shop Drawings	Indicate locker plan layout, numbering plan and combination lock cod	1.3.C													
421			10 51 00		Samples	Submit two samples 3 x 6 inches in size, of each color scheduled	1.3.D													
422			10 56 00		Refer to Section 11 06 00	Equipment Schedule for submittal requirements listed in the "Submittals" column of the equipment list. In the event of conflict between Section 11 06 00 Equipment Schedule and the following expanded submittal descriptions, Section 11 06 00 Equipment Schedule is to govern	1.5.A													
423			10 56 00		Product Data	Product Data	1.5.B													
424			10 56 00		Product Data	Submit Product Data in accordance with Division 1 - General Requirements of these specifications.	1.5.B.1													
425			10 56 00		Product Data	All Product Data submittals shall identify proposed project specific items marked by arrow, circle, underline, reproducible highlight, or other markings clearly discernable by the reviewer, to show which specific items, parts and accessories are being submitted for the project product data review. Non-marked or generic product data submittals with no marks indicating specific items, parts and accessories will be a cause for rejection.	1.5.B.2													
426					Product Data	Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page	1.5.B.3													
427			10 56 00		Operation and Maintenance Manual	Operation and Maintenance Manual	1.5.C													

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428			10 56 00		Operation and Maintenance Manual	Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:	1.5.C.1													
429			10 56 00		Operation and Maintenance Manual	Description of system and components.	1.5.C.1.a													
430			10 56 00		Operation and Maintenance Manual	Manufacturer's printed operating instructions.	1.5.C.1.b													
431			10 56 00		Operation and Maintenance Manual	Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.	1.5.C.1.c													
432			10 56 00		Operation and Maintenance Manual	List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.	1.5.C.1.d													
433			10 56 00		Operation and Maintenance Manual	Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1 - General Requirements.	1.5.C.2													
434			10 56 00		Shop Drawings	Submit shop drawings in accordance with Division 1 -General Requirements of these specifications. Refer to Section 11 06 00 Equipment Schedule for the equipment mark numbers requiring shop drawings	1.5.D													
435			0 56 00		Shop Drawings	Submitted shop drawings shall be project specific and shall include a minimum 1/8 inch to 1 foot scaled (or larger standard architectural imperial scale), dimensioned, graphical representation of the size, orientation, and location for the submitted equipment. The drawings shall further include dimensions from structural elements or architectural grid lines, operational clearances, locations of any utility service connection points, mounting requirements, and structural supports required for the submitted equipment.	1.5.D.1													

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436			10 56 00		Required Documents for Permit and Local Jurisdictional Approval	Where required by local jurisdiction and/or code officials, the trade contractor/supplier shall be responsible for producing and submitting all documentation required for obtaining any and all applicable approvals related to the specified equipment. This documentation may include, but may not be limited to, engineered signed and stamped plans, details, anchorage layouts for storage equipment, as well as racks to show compliance with locally adopted ASCE, seismic, fire, and other codes. A copy of these required documents shall be included with the product submittal to CTDOT PM for their review.	1.5.E														
437			10 56 00		Required Documents for Permit and Local Jurisdictional Approval	Where required by local jurisdiction and/or code officials, the trade contractor/supplier shall be responsible for producing and submitting all documentation required for obtaining any and all applicable approvals related to the specified equipment. This documentation may include, but may not be limited to, engineered signed and stamped plans, details, anchorage layouts for storage equipment, as well as racks to show compliance with locally adopted ASCE, seismic, fire, and other codes. A copy of these required documents shall be included with the product submittal to CTDOT PM for their review.	1.5.E														
438			10 75 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures.and Document Control	1.2.A													

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439			10 75 00		Shop Drawings	Submit detailed Shop Drawings for each item required to be fabricated or installed under this Item. Include plans, sections and details as required to show all materials, layout, dimensions, method of connection and assembly, fabrication and tolerances for types of materials, types and details of connections and openings, cuts, holes, bolts and painting for all items required. Take all necessary field dimensions and verify dimensions as required.	1.2.B														
440			10 75 00		Product Data	Prior to ordering the flagpoles, submit product literature for all materials required to complete the work of flagpole installation and representative samples of the flagpole finish for approval. Do not order materials until Engineer's approval has been obtained. Delivered materials shall be the same as the approved samples.	1.2.C													
441			11 06 00		Submittals	Identifies type(s) of submittals required	Part 1.5.a													
442			11 06 00		Submittals	PD = Product Data	Part 1.5.b													
443			11 06 00		Submittals	SD = Shop Drawings	Part 1.5.c													
444			11 06 00		Submittals	OM = Operation and Maintenance Manuals	Part 1.5.d													
445			11 06 00		Submittals	T = Training of Owner's personnel on specific equipment items	Part 1.5.e													
446			11 06 00		Submittals	TR = Test Reports	Part 1.5.f													
447			11 11 36		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
448			11 11 36		Shop Drawing	Trade Contractor is to submit shop drawing of electric vehicle charger for review and approval prior to ordering	1.3.C													
449			11 13 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
450			11 13 13		Product Data	Indicate unit dimensions, method of anchorage, and details of construction	1.3.B													
451			11 40 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
452			11 40 00		Product Data	Provide data on appliances; indicate configuration, sizes, materials, finishes, locations, and utility service connection locations, service characteristics, and wiring diagrams	1.4.B													
453			11 40 00		Manufacturer's Installation Instructions	Indicate special procedures, and perimeter conditions requiring special attention.	1.4.C													
454			11 40 00		Certificates	Certify that products of this section meet or exceed specified requirements.	1.4.D													

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455			11 40 00		Operation Data	Provide operating data for the specified equipment	1.4.E													
456			11 40 00		Maintenance Data	Provide lubrication and periodic maintenance requirement schedules.	1.4.F													
457			11 40 00		Warranty	Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.	1.4.G													
458			11 96 00		Refer to Section 11 06 00	Equipment Schedule for submittal requirements listed in the "Submittals" column of the equipment list. In the event of conflict between Section 11 06 00 Equipment Schedule and the following expanded submittal descriptions, Section 11 06 00 Equipment Schedule is to govern.	1.5.A													
459			11 96 00		Product Data	Product Data	1.5.B													
460			11 96 00		Product Data	Submit Product Data in accordance with Division 1 - General Requirements of these specifications	1.5.B.1													
461			11 96 00		Product Data	All Product Data submittals shall identify proposed project specific items marked by arrow, circle, underline, reproducible highlight, or other markings clearly discernable by the reviewer, to show which specific items, parts and accessories are being submitted for the project product data review. Non-marked or generic product data submittals with no marks indicating specific items, parts and accessories will be a cause for rejection	1.5.B.2													
462			11 96 00		Product Data	Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page	1.5.B.3													
463			11 96 00		Operation and Maintenance Manual:	Operation and Maintenance Manual:	1.5.C													
464			11 96 00		Operation and Maintenance Manual:	Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to	1.5.C.1													
465			11 96 00		Operation and Maintenance Manual:	Description of system and components	1.5.C.1.a													
466			11 96 00		Operation and Maintenance Manual:	Schematic diagrams of electrical, plumbing and compressed air systems	1.5.C.1.b													

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467			11 96 00		Operation and Maintenance Manual:	Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.	1.5.C.1.c													
468			11 96 00		Operation and Maintenance Manual:	List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source	1.5.C.1.d													
469			11 96 00		Operation and Maintenance Manual:	Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1 - General Requirements	1.5.C.1.e													
470			11 96 00		Shop Drawings	Submit Shop Drawings in accordance with Division 1 -General Requirements of these specifications. Refer to Section 11 06 00 Equipment Schedule for the equipment mark numbers requiring shop drawings.	1.5.D													
471			11 96 00		Shop Drawings	Submitted shop drawings shall be project specific and shall include a minimum 1/8 inch to 1 foot scaled (or larger standard architectural imperial scale), dimensioned, graphical representation of the size, orientation, and location for the submitted equipment. The drawings shall further include dimensions from structural elements or architectural grid lines, operational clearances, locations of any utility service connection points, mounting requirements, and structural supports required for the submitted equipment.	1.5.D.1													
472			12 24 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													
473			12 24 00		Product Data:	Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.	1.5.B													
474			12 24 00		Shop Drawings	Include shade schedule indicating size, location and keys to details.	1.5.C													
475			12 24 00		Certificates	Manufacturer's documentation that line voltage components are UL listed or UL recognized.	1.5.D													

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476			12 24 00		Selection Samples	Minimum size 6 inches square, representing actual materials, color and pattern.	1.5.E													
477			12 24 00		Verification Samples	Minimum size 6 inches square, representing actual materials, color and pattern.	1.5.F													
478			12 24 00		Manufacturer's Instructions:	Include instructions for storage, handling, protection, examination, preparation, and installation of product	1.5.G													
479			12 24 00		Warranty	Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.	1.5.H													
480			13 34 23.10		Refer to Section 11 06 00	Equipment Schedule for submittal requirements listed in the "Submittals" column of the equipment list. In the event of conflict between Section 11 06 00 Equipment Schedule and the following expanded submittal descriptions, Section 11 06 00 Equipment Schedule is to govern	1.4.A													
481			13 34 23.10		Shop Drawings:	Submit Shop Drawings in accordance with Division 01 - General Requirements of these specifications. Refer to Section 11 06 00 Equipment Schedule for the equipment mark numbers requiring shop drawings.	1.4.B													
482			13 34 23.10		Shop Drawings:	Submitted shop drawings shall be project specific and shall include a minimum 1/8 inch to 1 foot scaled (or larger standard architectural imperial scale), dimensioned, graphical representation of the size, orientation, and location for the submitted equipment. The drawings shall further include dimensions from structural elements or architectural grid lines, operational clearances, locations of any utility service connection points, mounting requirements, and structural supports required for the submitted equipment.	1.4.B.1													
483			3 34 23.10		Warranty:	Submit warranties in accordance with Division 01 - General Requirements of these specifications.	1.5.D													
484			14 20 10		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.5.A													
485			14 20 10		Shop Drawings:	Indicate the following information	1.5.B													
486			14 20 10		Shop Drawings:	Locations of machine room equipment: driving machines, controllers, governors and other component	1.5.B.1													

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487			14 20 10		Shop Drawings:	Hoistway components: Car, counterweight, sheaves, machine and sheave beams, guide rails, buffers, ropes, and other components.	1.5.B.2													
488			14 20 10		Shop Drawings:	Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.	1.5.B.3													
489			14 20 10		Shop Drawings:	Electrical characteristics and connection requirements.	1.5.B.4													
490			14 20 10		Product Data	Provide data on the following items	1.5.C													
491			14 20 10		Product Data	Signal and operating fixtures, operating panels, indicators.	1.5.C.1													
492			14 20 10		Product Data	Cab design, dimensions, layout, and components.	1.5.C.2													
493			14 20 10		Product Data	Cab and hoistway door and frame details.	1.5.C.3													
494			14 20 10		Product Data	Electrical characteristics and connection requirements.	1.5.C.4													
495			14 20 10		Maintenance Trade Contract.	Maintenance Trade Contract.	1.5.D													
496			14 20 10		Maintenance Data.	Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code	1.5.E													
497			14 20 10		Maintenance Data.	Technical information for servicing operating equipment.	1.5.E.1													
498			14 20 10		Maintenance Data.	Legible schematic of hydraulic piping and wiring diagrams of installed electrical equipment and changes made in the Work. List symbols corresponding to identity or markings on machine room and hoistway apparatus.	1.5.E.2													
499			21 05 00		Requirements	Refer to any front end specifications for additional detailed requirements regarding shop drawings, product data, and samples.	1.5.A													
500			21 05 00		Review	The Sprinkler Trade Contractor shall be responsible for all fees associated with the AHJ's reviews.	1.5.B													

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501			21 05 00		Submittal	The submittal shall be made as a complete package consisting of fire protection equipment ONLY. The submittal shall NOT include other plumbing equipment or components not directly related to the fire protection system installation for approval. Where other equipment or components are an integral part of the fire protection system, they shall be indicated as such, but not included with the submittal and only show required interface details. Failure to submit all required materials as a complete, separate single package shall be cause for rejection of entire package. Copies of the Sprinkler Trade Contractor's notes thereon will be rejected. Simply redlining the Design Documents is not acceptable.	1.5.C														
502			21 05 00		Additional Requirements	Refer to the individual sections for additional submittal requirements, including identified equipment and materials for which submittals are required.	1.5.D													
503			21 05 00		Qualifications	Submit the Sprinkler Trade Contractor Qualifications to the Engineer-of-Record.	1.5.E													
504			21 05 00		Qualifications	Fire Protection Engineer Credentials	1.5.E.1													
505			21 05 00		Qualifications	Installation Experience	1.5.E.2													
506			21 05 00		Qualifications	Designer Certification	1.5.E.3													
507			21 05 00		Data	The Sprinkler Trade Contractor shall submit, for review by the Engineer-of-Record, identification and data of specific materials and equipment to be incorporated in the project. Shop drawings, hydraulic calculations, catalog cuts, and associated materials shall be submitted as a complete, single package. This package shall include:	1.5.F													
508			21 05 00		Data	Water flow test results.	1.5.F.1													
509			21 05 00		Data	Product data.	1.5.F.2													
510			21 05 00		Data	Complete shop drawings.	1.5.F.3													
511			21 05 00		Data	Submit materials and information described in NFPA 13, NFPA 24, NFPA 25, NFPA 70 and NFPA 72.	1.5.F.4													
512			21 05 00		Data	Hydraulic calculations and piping drawings. All calculations and CAD drawings shall:	1.5.F.5													

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513			21 05 00		Data	Be prepared under the direct supervision of an individual having NICET Level III or IV certification or an individual having registration as a Professional Engineer. Preparation of hydraulic calculations and/or piping drawings by individuals who do not have said certification or who are not directly supervised by an individual with said certification is prohibited.	1.5.F.5.a													
514			21 05 00		Data	Be prepared using a commercially available computer models such as HASS, HydraCALC, Sprinkler-CALC, Sigma or "THE"	1.5.F.5.b													
515			21 05 00		Data	a. Be prepared using the same computer model. Hydraulic calculations and the model used shall be consistent throughout the project. Hydraulic calculations shall be neat and orderly (e.g. columns and rows line up accordingly on printouts).	1.5.F.5.c													
516			21 05 00		Data	Have hydraulic reference points, provided in a systematic and consistent manner, clearly indicated on both the shop drawings and the hydraulic calculations.	1.5.F.5.d													
517			21 05 00		Data	Where sprinkler systems are submitted separately, a schematic drawing indicating locations of all nodes used in the hydraulic calculations shall be included with the submission. Common piping and nodes shall utilize that same nomenclature.	1.5.F.6													
518			21 05 00		Data	Where phasing of construction requires submission of portions of the system, all piping and equipment associated with any calculations must be provided with the submittal. Additionally, the phasing plan as it relates to the fire protection system installation shall be provided either diagrammatically or by narrative.	1.5.F.7													
519			21 05 00		Revisions	Where the Sprinkler Trade Contractor must revise and resubmit, the revised submittal shall be accompanied by the written response to all previous submittal comments. Failure to provide written response to previous comments shall be cause for rejection of the submittal.	1.5.G													

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520			21 05 00		CAD Drawings	CAD layout drawings shall be submitted for the automatic sprinkler system. The layout drawings shall be prepared at a scale of not less than 1/8 inch = 1 foot, and drawings sheet size shall be either 24x36 or 30x42 inches. All drawing sizes shall be approved by the General Trade Contractor prior to submitting and shall be of one size only	1.5.H														
521			21 05 00		CAD Drawings	All Room numbers shall be provided on the drawings.	1.5.H.1													
522			21 05 00		CAD Drawings	Plan and Elevation views of the mechanical room showing the sprinkler riser, proposed piping, equipment pads, dimensions of openings in floors, roofs, and walls, and equipment to establish that all proposed equipment will fit within the allotted spaces with clearances for installation and maintenance.	1.5.H.2													
523			21 05 00		CAD Drawings	Plan views, with elevation views where necessary for clarity, of all piping and distribution systems indicating locations of proposed piping, hangers, sprinklers, water flow switches, hose outlets, and penetrations to fire-rated or smoke enclosure walls.	1.5.H.3													
524			21 05 00		CAD Drawings	Where trapeze hangers are to be used, provide all pertinent information for determining size of trapeze member.	1.5.H.4													
525			21 05 00		CAD Drawings	The drawings shall show proposed details for attachment, anchoring, and hanging to structural framing of the building; vibration isolation units; foundation and support; location and size of sleeves and prepared openings for passage of pipes.	1.5.H.5													
526			21 05 00		CAD Drawings	The available water supply data for the sprinkler system design shall be provided on the drawing that indicates the location of the fire protection water service entrance.	1.5.H.6													
527			21 05 00		CAD Drawings	Items on or projecting through the ceiling shall be coordinated with other items and shall be shown on the reflected ceiling plan shop drawings submitted for the Engineer-of-Record's review.	1.5.H.7													

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528			21 05 00		Shop Drawings:	The Sprinkler Trade Contractor shall forward to all AHJ's, for their review and comment, a minimum of 3 sets of the shop drawings indicating the final sprinkler head layout with associated hydraulic calculations.	1.5.I													
529			21 05 00		Electrical Data	Fire Protection Equipment Electrical Data shall be submitted for review:	1.5.J													
530			21 05 00		Electrical Data	Verify that electrical characteristics of equipment submittals comply with electrical service provided for the specified items of equipment	1,5,J,1													
531			21 05 00		Electrical Data	Coordinate the electrical service requirements	1.5.J.2													
532			21 05 00		Operation and Maintenance Manuals	Operation and Maintenance Manuals shall be provided and include system components, water flow test information, CAD as-built drawings, as-built hydraulic calculations, and test certifications as a minimum. See Operations and Maintenance section of this Specification.	1.5.K													
533			21 05 00		Approval	All firestopping material and installation methods must be approved by the Engineer-of-Record.	1.5.L													
534			21 05 00		Provide a Valve Chart	Provide 3 copies in metal frame with clear window. Mount on wall at locations directed by the CTDOT PM.	1.5.M													
535			21 05 00		Provide documentation of grooved coupling training.	Provide documentation of grooved coupling training.	1.5.N													
536			21 05 00		Drawings	The Sprinkler Trade Contractor shall submit for review and approval to the Engineer-of Record three (3) sets of shop drawings and hydraulic calculations indicating the sprinkler system layout including head locations. Submit drawings with the required application and fee.	1.5.O													
537			21 05 17		Product Data	For each type of product indicated.	1.3													
538			21 05 18		Product Data	For each type of product indicated.	1.3													
539			21 05 48		Product Data	For the following	1.5.A													
540			21 05 48		Product Data	Include rated load, rated deflection, and overload capacity for each vibration isolation device.	1.5.A.1													
541			21 05 48		Product Data	Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used	1.5.A.2													
542			21 05 48		Product Data	Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES.	1.5.A.2.a													

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543			21 05 48		Product Data	Annotate to indicate application of each product submitted and compliance with requirements.	1.5.A.2.b													
544			21 05 48		Delegated-Design Submittal	For vibration isolation and seismic-restraint details 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.B													
545			21 05 48		Delegated-Design Submittal	Design Calculations	1.5.B.1													
546			21 05 48		Delegated-Design Submittal	Seismic-Restraint Details	1.5.B.2													
547			21 05 48		Delegated-Design Submittal	Design Analysis	1.5.B.2.a													
548			21 05 48		Delegated-Design Submittal	Details	1.5.B.2.b													
549			21 05 48		Delegated-Design Submittal	Preapproval and Evaluation Documentation	1.5.B.3.c													
550			21 13 13		Submittals	All submittals shall comply with any front end specification requirements as well as Section 21 05 00.	1.3.A													
551			21 13 13		Product Data	Product Data shall be submitted on the following items. Where more than one item, or a specific item with multiple options appear on a single cut sheet, the items shall be specifically indicated:	1.3.B													
552			21 13 13		Product Data	Waterflow Switches	1.3.B.1													
553			21 13 13		Product Data	Supervisory Switches	1.3.B.2													
554			21 13 13		Product Data	Sprinkler Heads, Cabinet, Escutcheons, and Guards	1.3.B.3													
555			21 13 13		Product Data	Fire Department Connection	1.3.B.4													
556			21 13 13		Product Data	Hose Valves	1.3.B.5													
557			21 13 13		Product Data	Piping, Fittings, and Mechanical Couplings	1.3.B.6													
558			21 13 13		Product Data	Hangers and Supports	1.3.B.7													
559			21 13 13		Product Data	Test/Drain Assemblies	1.3.B.8													
560			21 13 13		Product Data	Control Valves	1.3.B.9													
561			21 13 13		Product Data	Alarm Check Valves	1.3.B.10													
562			21 13 13		Product Data	Dry Pipe Valve and Appurtenances	1.3.B.11													
563			21 13 13		Product Data	Backflow Prevention Device	1.3.B.12													
564			21 13 13		Product Data	Electric Alarm Valve	1.3.B.13													
565			21 13 13		Product Data	Means of Identification of Piping and Valves	1.3.B.14													
566			21 13 13		Product Data	Means of Identification of Concealed Control Valve Locations	1.3.B.15													
567			21 13 13		Product Data	Seismic Separation Assemblies	1.3.B.16													
568			21 13 13		Product Data	Soffit System, including product sample, color samples, and means and methods of installing	1.3.B.17													
569			21 13 13		Operation and Maintenance	Data shall be submitted on the following items:	1.3.C.1													
570			21 13 13		Operation and Maintenance	Waterflow Switches	1.3.C.1.a													

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571			21 13 13		Operation and Maintenance	Supervisory Switches	1.3.C.1.b													
572			21 13 13		Operation and Maintenance	Sprinkler Heads	1.3.C.1.c													
573			21 13 13		Operation and Maintenance	Fire Department Connection	1.3.C.1.d													
574			21 13 13		Operation and Maintenance	Fire Hose Valves	1.3.C.1.e													
575			21 13 13		Operation and Maintenance	Test/Drain Assemblies	1.3.C.1.f													
576			21 13 13		Operation and Maintenance	Control Valves	1.3.C.1.g													
577			21 13 13		Operation and Maintenance	Alarm Check Valves	1.3.C.1.h													
578			21 13 13		Operation and Maintenance	Dry Pipe Valve and Appurtenances	1.3.C.1.i													
579			21 13 13		Operation and Maintenance	Backflow Prevention Device	1.3.C.1.j													
580			21 13 13		Operation and Maintenance	Completed Final Certificates for All System Tests	1.3.C.2													
581			21 13 13		Hydraulic Calculations	Hydraulic Calculations	1.3.D													
582			21 13 13		Hydraulic Calculations	Data and all relevant drawings shall be submitted indicating hydraulic design calculations, flows, pressures, pipe sizes, and layout of all piping; including the outside underground to the effective point of available water supply data. Calculations and pipe layout shall also be submitted and must be approved by the AHJ and FM Global. Provide responses to any and all comments received from the AHJ and FM Global and resolution thereof to the Engineer-of Record.	1.3.D.1														
583			21 13 13		Hydraulic Calculations	Include the allowance for inside hose stream connections at the point of connection. Include the allowance for outside hose streams and domestic usage.	1.3.D.2													
584			21 13 13		Hydraulic Calculations	Hydraulic calculations shall be provided for the remote area of each specific hazard class (e.g., Light, Ordinary Group 1, and Ordinary Group 2 and FM Global HC-1, HC-2 and HC-3).	1.3.D.3													
585			21 13 13		Hydraulic Calculations	Common piping throughout different sets of calculations shall utilize the same nomenclature.	1.3.D.4													
586			21 13 13		Shop Drawings	Shop Drawings	1.3.E													
587			21 13 13		Shop Drawings	CAD drawings shall be provided in accordance with the requirements of Section 21 05 00 and NFPA 13. Provide CAD working plan drawings and data as required by NFPA 13. The shop drawings, scaled at a minimum of 1/8 inch = 1 foot shall:	1.3.E.1													

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588			21 13 13		Shop Drawings	Provide Room Names and/or Numbers along with the reflected ceiling layout, including light fixture locations, HVAC diffuser locations, and other ceiling mounted fixtures and devices to verify that the sprinkler system layout has been coordinated with the other trades.	1.3.E.1.a													
589			21 13 13		Shop Drawings	Provide the noded and dimensioned portion of the sprinkler system drawing independently of the reflected ceiling plan drawings (for clarity in submittal reviews).	1.3.H.1.b													
590			21 13 13		Shop Drawings	Provide ceiling elevations and pipe elevations.	1.3.E.1.c													
591			21 13 13		Shop Drawings	Indicate make, type, and orifice size of sprinkler heads.	1.3.E.1.d													
592			21 13 13		Shop Drawings	Identify all locations where piping and/or fittings will be exposed to sight along with identification of all trapped segments of pipe and auxiliary/low-point drains.	1.3.E.1.e													
593			21 13 13		Shop Drawings	Provide piping volume calculations for the Dry Pipe System	1.3.E.1.f													
594			21 13 13		Shop Drawings	Identify all walls and/or floors which are fire-rated, smoke barriers, or smoke partitions that are penetrated by the fire protection piping or equipment. Identification of the wall/floor and penetration thereto shall include the required rating, type of construction, and reference to type of penetration seal that is to be used (including UL System Number). Refer to Architectural Drawings for locations.	1.3.E.1.g													
595			21 13 13		Shop Drawings	Include a diagram of all control valves, checks, drain pipes, and test pipes.	1.3.E.1.h													
596			21 13 13		Shop Drawings	Include a diagram of the underground water supply to the building. Include all piping between the building and the location of the confirming water flow test data. Identify source of water supply, pressure, and elevation.	1.3.E.1.i													
597			21 13 13		Shop Drawings	Provide a copy of the hydraulic design information sign that will be installed on the riser.	1.3.E.1.j													
598			21 13 13		As-Builts		1.3.F													

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CONTRACTOR:	

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599			21 13 13		As-Builts	Prior to final acceptance, complete CAD as-built drawings and hydraulic calculations shall be submitted to the Engineer-of-Record for review. As-builts shall reflect all piping and head location deviations from the approved shop drawings including additional fittings.	1.3.F.1													
600			21 13 13		As-Builts	Provide one half-sized, laminated set of approved as-built drawings. Install a complete set of these drawings at each sprinkler riser location.	1.3.F.2													
601			21 13 13		As-Builts	Provide a copy of the revised hydraulic design information sign. Upon approval, install on each sprinkler riser.	1.3.F.3													
602			21 13 13		As-Builts	Coordinate as-built submission with Section 21 05 00.	1.3.F.4													
603			22 00 00		Shop Drawings	Shop Drawings	1.6													
604			22 00 00		Shop Drawings	Submittals shall be prepared in pdf format	1.6.A.1													
605			22 00 00		Shop Drawings	Submittals shall include, but not be limited to the following	1.6.A.2													
606			22 00 00		Shop Drawings	Valves and specialty items.	1.6.A.2.a													
607			22 00 00		Shop Drawings	Piping and fittings	1.6.A.2.b													
608			22 00 00		Shop Drawings	Drains.	1.6.A.2.c													
609			22 00 00		Shop Drawings	Backflow preventers.	1.6.A.2.d													
610			22 00 00		Shop Drawings	Water hammer arrestors	1.6.A.2.e													
611			22 00 00		Shop Drawings	Trap primers	1.6.A.2.f													
612			22 00 00		Shop Drawings	Insulation	1.6.A.2.g													
613			22 00 00		Shop Drawings	Cleanouts	1.6.A.2.h													
614			22 00 00		Shop Drawings	Fixtures	1.6.A.2.i													
615			22 00 00		Shop Drawings	Water heating systems	1.6.A.2.j													
616			22 00 00		Shop Drawings	No-hub couplings	1.6.A.2.k													
617			22 00 00		Shop Drawings	Pumps	1.6.A.2.l													
618			22 00 00		Shop Drawings	Compressed air system	1.6.A.2.m													
619			22 00 00		Shop Drawings	Copper pipe supports in chases and plumbing batteries	1.6.A.2.n													
620			22 00 00		Shop Drawings	Submittals shall indicate compliance with specifications and drawings	1.6.A.3													
621			22 00 00		Shop Drawings	Include copy of relevant specifications with each submittal. In margins of specification, next to each line item, sentence or paragraph, indicate "complies" or "deviates". If deviation, note the reasons.	1.6.A.4													
622			22 00 00		Shop Drawings	Similarly, include copy of equipment schedules and drawing notes relevant to the submitted product. Next to each row in the equipment schedule, note compliance or deviations	1.6.A.5													

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623			22 00 00		Shop Drawings	Include copy of drawing notes. Next to each note, indicate compliance or deviations.	1.6.A.6													
624			22 00 00		Shop Drawings	Submittal shall include manufacturers Installation Operation and Maintenance documentation. Indicate exceptions or deviations from installation instructions, note the deviation and reasons.	1.6.A.7													
625			22 00 00		Shop Drawings	Re-submittals shall include a Re-submittal Summary to address previous review comments shall include an explanation of how each review comment has been addressed.	1.6.A.8													
626			22 00 00		Shop Drawings	Submittals shall be logically arranged with Acrobat PDF Bookmarks for identification and navigation thru each section. Bookmarks shall be numbered and lettered.	1.6.A.9													
627			22 00 00		Shop Drawings	Submittals in 3-ring binders shall include an index of contents and divider tabs.	1.6.A.10													
628			22 00 00		Shop Drawings	Submittals not complying with the format requirements will be returned and will not be reviewed.	1.6.A.11													
629			22 00 00		Shop Drawings	Only manufacturers listed or approved by addendum will be accepted.	1.6.B													
630			22 07 00		Insulation and Accessory	Submit for each type of insulation and accessory. Include installation instructions and manufacturers recommendations.	1.2.A													
631			22 07 00		Application	Include manufacturer's product number, K-value, thickness, and accessories in tabular forms for each type of different application.	1.2.B													
632			22 07 00		See Section 22 00 00	or additional general requirements.	1.2.C													
633			22 13 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4													
634			22 13 13		Technical Information	Within 30 days after the Award of Trade Contract, and before materials and/or equipment are delivered to the site, submit to the CTDOT PM technical information on equipment to be furnished and certification of compliance with applicable standard tests for materials to be used, if materials and/or appurtenances are other than brand names specified.	1.4.A													

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635			22 13 13		Substitution	Where the phrases "or equal" or "of equal quality" appear, substitution may be made only by approval of the CTDOT PM. Such substitution will be considered only when submitted with full and complete technical data and information for evaluation prior to installation. (See Section 01 25 00 Substitution Procedures).	1.4.B													
636			22 13 13		Samples	An independent testing company, approved by the CTDOT PM, shall obtain samples and provide sieve analysis for the granular materials to be used	1.4.C													
637			22 13 13		Testing	An independent testing company, approved by the CTDOT PM, shall provide compaction tests as required.	1.4.D													
638			22 13 13		Testing	An independent testing company, approved by the CTDOT PM, shall provide current concrete design mix with a 7 day and two 28 day compressive strength tests for any concrete requiring reinforcing steel.	1.4.E													
639			22 13 13		Interrupting any utility	Provide minimum of 48-hour notice to CTDOT PM, and a written authorization notice to proceed from the affected utility, before interrupting any utility	1.4.F													
640			22 13 13		Testing	Submit written results of all tests on the installed utilities and appurtenances to the CTDOT PM.	1.4.G													
641			22 13 13		Installation	Verify that all materials and equipment will be available in time for orderly installation during the course of the work.	1.4.H													
642			23 05 00		Welding certificates	Welding certificates	1.3.A													
643			23 05 17		Product Data	For each type of product indicated	1.3.A													
644			23 05 29		Product Data	For each type of product indicated	1.5.A													
645			23 05 29		Shop Drawings	Include Product Data for components	1.5.B													
646			23 05 29		Shop Drawings	Trapeze pipe hangers	1.5.B.1													
647			23 05 29		Shop Drawings	Metal framing systems	1.5.B.2													
648			23 05 29		Shop Drawings	Equipment supports	1.5.B.3													
649			23 05 29		Welding Certificates	Welding Certificates	1.6.A													
650			23 05 48		Product Data	Product Data	1.5.A													
651			23 05 48		Product Data	Include rated load, rated deflection, and overload capacity for each vibration isolation device.	1.5.A.1													
652			23 05 48		Product Data	Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.	1.5.A.2													

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653			23 05 48		Product Data	Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES.	1.5.A.2.a													
654			23 05 48		Product Data	Annotate to indicate application of each product submitted and compliance with requirements.	1.5.A.2.b													
655			23 05 48		Coordination Drawings	Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.	1.6.A													
656			23 05 48		Qualification Data	For testing agency	1.6.B													
657			23 05 48		Welding certificates	Welding certificates	1.6.C													
658			23 05 48		Air-Mounting System Performance Certification	Include natural frequency, load, and damping test data performed by an independent agency	1.6.D													
659			23 05 48		Field quality-control test reports		1.6.E													
660			23 05 48		Operation and Maintenance Data	For air-mounting systems to include in operation and maintenance manuals	1.7													
661			23 05 53		Product Data:	For each type of product indicated	1.3.A													
662			23 05 53		Samples	For color, letter style, and graphic representation required for each identification material and device.	1.3.B													
663			23 05 53		Equipment Label Schedule	Include a listing of all equipment to be labeled with the proposed content for each label	1.3.C													
664			23 05 53		Valve numbering scheme	Valve numbering scheme	1.3.D													
665			23 05 53		Valve Schedules	For each piping system to include in maintenance manuals.	1.3.E													
666			23 05 93		LEED Submittals	LEED Submittals	1.4.A													
667			23 05 93		LEED Submittals	Air-Balance Report for Prerequisite IEQ 1: Documentation of work performed for ASHRAE 62.1, Section 7.2.2 - "Air Balancing.	1.4.A.1													
668			23 05 93		LEED Submittals	TAB Report for Prerequisite EA 2: Documentation of work performed for ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing.	1.4.A.2													
669			23 05 93		Qualification Data	Within 30 days of Trade Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.	1.5.A													
670			23 05 93		Strategies and Procedures Plan	Within 30 days of Trade Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article	1.5.B													
671			23 05 93		Certified TAB reports	Certified TAB reports	1.5.C													

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672			23 05 93		Sample report forms	Sample report forms	1.5.D													
673			23 05 93		Instrument calibration reports, to include the following	Instrument calibration reports, to include the following	1.5.E													
674			23 05 93		Instrument calibration reports	Instrument type and make.	1.5.E.1													
675			23 05 93		Instrument calibration reports	Serial number.	1.5.E.2													
676			23 05 93		Instrument calibration reports	Application	1.5.E.3													
677			23 05 93		Instrument calibration reports	Dates of use	1.5.E.4													
678			23 05 93		Instrument calibration reports	Dates of calibration	1.5.E.5													
679			23 07 13		Product Data	For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any)	1.3.A													
680			23 07 13		LEED Submittals:	LEED Submittals:	1.3.B													
681			23 07 13		LEED Submittals:	Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.	1.3.B.1													
682			23 07 13		LEED Submittals:	Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that products 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."	1.3.B.2													
683			23 07 13		Shop Drawings	Include plans, elevations, sections, details, and attachments to other work.	1.3.C													
684			23 07 13		Shop Drawings	Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.	1.3.C.1													
685			23 07 13		Shop Drawings	Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.	1.3.C.2													
686			23 07 13		Shop Drawings	Detail application of field-applied jackets	1.3.C.3													
687			23 07 13		Shop Drawings	Detail application at linkages of control devices.	1.3.C.4													
688			23 07 13		Material Test Reports	From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.	1.4.A													
689			23 09 23		Damper schedules	Damper schedules	1.4.A													
690			23 09 23		Equipment data cut sheets	Equipment data cut sheets	1.4.B													
691			23 09 23		System schematics, including	System schematics, including	1.4.C													

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692			23 09 23		System schematics, including	Sequence of operations	1.4.C.1													
693			23 09 23		System schematics, including	Point names	1.4.C.2													
694			23 09 23		System schematics, including	Point addresses	1.4.C.3													
695			23 09 23		System schematics, including	Interface wiring diagrams	1.4.C.4													
696			23 09 23		System schematics, including	Panel layouts	1.4.C.5													
697			23 09 23		Auto-CAD compatible as-built drawings	Auto-CAD compatible as-built drawings	1.4.D													
698			23 09 23		PDF of actual Graphics	PDF of actual Graphics	1.4.E													
699			23 09 23		Submittal for Cx Review	Controls programming or block logic shall be submitted for review to verify that the programming conforms to the design intent by the Cx Agent. Submit for Cx Agent review once before implementation, once as a virtual simulation, and once again after implementation to verify proper performance. With each submittal include actual graphic. Sample, template or example graphics are not acceptable	1.4.F													
700			23 09 23		operation and maintenance manuals	Upon project completion, submit operation and maintenance manuals, consisting of the following	1.4.G													
701			23 09 23		operation and maintenance manuals	Index sheet, listing contents in alphabetical order	1.4.G.1													
702			23 09 23		operation and maintenance manuals	Manufacturer's equipment parts list of all functional components of the system, Auto-CAD disk of system schematics, including wiring diagrams	1.4.G.2													
703			23 09 23		operation and maintenance manuals	Description of sequence of operations	1.4.G.3													
704			23 09 23		operation and maintenance manuals	As-Built interconnection wiring diagrams	1.4.G.4													
705			23 09 23		operation and maintenance manuals	Operator's Manual	1.4.G.5													
706			23 09 23		operation and maintenance manuals	Trunk cable schematic showing remote electronic panel locations, and all trunk data	1.4.G.6													
707			23 09 23		operation and maintenance manuals	List of connected data points, including panels to which they are connected and input device (ionization detector, thermostat, etc.)	1.4.G.7													
708			23 09 23		operation and maintenance manuals	Conduit routing diagrams	1.4.G.8													
709			23 23 00		Product Data	For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:	1.4.A													
710			23 23 00		Product Data	Thermostatic expansion valves	1.4.A.1													
711			23 23 00		Product Data	Solenoid valves	1.4.A.2													
712			23 23 00		Product Data	Hot-gas by-pass valves	1.4.A.3													

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713			23 23 00		Product Data	Filter dryers	1.4.A.4													
714			23 23 00		Product Data	Strainers	1.4.A.5													
715			23 23 00		Product Data	Pressure-regulating valves	1.4.A.6													
716			23 23 00		Welding certificates	Welding certificates	1.5.A													
717			23 23 00		Field quality-control test reports	Field quality-control test reports	1.5.B													
718			23 23 00		Operation and Maintenance Data:	For refrigerant valves and piping specialties to include in maintenance manuals.	1.6.A													
719			23 29 23		Submittals shall include the following information	Submittals shall include the following information	1.3.A													
720			23 29 23		Submittals shall include the following information	Outline dimensions, conduit entry locations and weight	1.3.A.1													
721			23 29 23		Submittals shall include the following information	Customer connection and power wiring diagrams	1.3.A.2													
722			23 29 23		Submittals shall include the following information	Complete technical product description include a complete list of options provided. Any portions of this specification not meet must be clearly indicated or the supplier and trade contractor shall be liable to provide all additional components required to meet this specification.	1.3.A.3													
723			23 29 23		Submittals shall include the following information	Compliance to IEEE 519 – harmonic analysis for particular jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD	1.3.A.4													
724			23 29 23		Submittals shall include the following information	The VFD manufacturer shall provide calculations; specific to this installation, showing total harmonic voltage distortion is less than 5%. Input filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE standard 519. All VFD's shall include a minimum of 5% impedance reactors, no exceptions.	1.3.A.4.a													
725			23 31 13		Product Data	For each type of the following products	1.4.A													
726			23 31 13		Product Data	Liners and adhesives	1.4.A.1													
727			23 31 13		Product Data	Sealants and gaskets	1.4.A.2													
728			23 31 13		Product Data	Seismic-restraint devices	1.4.A.3													
729			23 31 13		Shop Drawings	Shop Drawings	1.4.B													
730			23 31 13		Shop Drawings	Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.	1.4.B.1													
731			23 31 13		Shop Drawings	Factory- and shop-fabricated ducts and fittings	1.4.B.2													
732			23 31 13		Shop Drawings	Duct layout indicating sizes, configuration, liner material, and static-pressure classes.	1.4.B.3													
733			23 31 13		Shop Drawings	Elevation of bottom of ducts.	1.4.B.4													

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734			23 31 13		Shop Drawings	Dimensions of main duct runs from building grid lines	1.4.B.5													
735			23 31 13		Shop Drawings	Fittings.	1.4.B.6													
736			23 31 13		Shop Drawings	Reinforcement and spacing	1.4.B.7													
737			23 31 13		Shop Drawings	Seam and joint construction	1.4.B.8													
738			23 31 13		Shop Drawings	Penetrations through fire-rated and other partitions	1.4.B.9													
739			23 31 13		Shop Drawings	Equipment installation based on equipment being used on Project.	1.4.B.10													
740			23 31 13		Shop Drawings	Locations for duct accessories, including dampers, turning vanes, and access doors and panels.	1.4.B.11													
741			23 31 13		Shop Drawings	Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation	1.4.B.12													
742			23 31 13		Coordination Drawings	Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:	1.5.A													
743			23 31 13		Coordination Drawings	Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.	1.5.A.1													
744			23 31 13		Coordination Drawings	Suspended ceiling components	1.5.A.2													
745			23 31 13		Coordination Drawings	Structural members to which duct will be attached.	1.5.A.3													
746			23 31 13		Coordination Drawings	Size and location of initial access modules for acoustical tile.	1.5.A.4													
747			23 31 13		Coordination Drawings	Penetrations of smoke barriers and fire-rated construction	1.5.A.5													
748			23 31 13		Coordination Drawings	Items penetrating finished ceiling including the following	1.5.A.6													
749			23 31 13		Coordination Drawings	Lighting fixtures.	1.5.A.6.a													
750			23 31 13		Coordination Drawings	Air outlets and inlets	1.5.A.6.b													
751			23 31 13		Coordination Drawings	Speakers	1.5.A.6.c													
752			23 31 13		Coordination Drawings	Sprinklers.	1.5.A.6.d													
753			23 31 13		Coordination Drawings	Access panels	1.5.A.6.e													
754			23 31 13		Coordination Drawings	Perimeter moldings	1.5.A.6.f													
755			23 33 00		Product Data	For each type of product.	1.3.A													
756			23 33 00		Product Data	For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.	1.3.A.1													
757			23 33 00		LEED Submittals	LEED Submittals	1.3.B													
758			23 33 00		LEED Submittals	Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."	1.3.B.1													

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759			23 33 00		LEED Submittals	Product Data for Prerequisite EA 2: Documentation indicating that duct insulation R-values comply with tables in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air Conditioning."	1.3.B.2													
760			23 33 00		Shop Drawings	For duct accessories. Include plans, elevations, sections, details and attachments to other work	1.3.C													
761			23 33 00		Shop Drawings	Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:	1.3.C.1													
762			23 33 00		Shop Drawings	Special fittings.	1.3.C.1.a													
763			23 33 00		Shop Drawings	Manual volume damper installations	1.3.C.1.b													
764			23 33 00		Shop Drawings	Control-damper installations.	1.3.C.1.c													
765			23 33 00		Shop Drawings	Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.	1.3.C.1.d													
766			23 33 00		Shop Drawings	Duct security bars.	1.3.C.1.e													
767			23 33 00		Shop Drawings	Wiring Diagrams: For power, signal, and control wiring.	1.3.C.1.f													
768			23 36 00		Product Data	For each type of product indicated	1.3.A													
769			23 36 00		Shop Drawings	For air terminal units. Include plans, elevations, sections, details, and attachments to other work.	1.3.B													
770			23 36 00		Field quality-control reports	Field quality-control reports	1.4.A													
771			23 36 00		Operation and maintenance data	Operation and maintenance data	1.5.A													
772			23 51 00		Product Data	Product Data	1.3.A													
773			23 51 00		Product Data	Type B and BW vents	1.3.A.1													
774			23 51 00		Shop Drawings	For vents, breechings, chimneys, and stacks. Include plans, elevations, sections, details, and attachments to other work	1.3.B													
775			23 51 00		Shop Drawings	Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, methods of field assembly, components, hangers and seismic restraints, and location and size of each field connection.	1.3.B.1													

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776			23 51 00		Shop Drawings	For installed products indicated to comply with design loads, include calculations required for selecting seismic restraints and structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.	1.3.B.2													
777			23 51 00		Manufacturer Seismic Qualification Certification	Submit certification that factory-fabricated breeching, chimneys, and stacks; accessories; and components will withstand seismic forces defined in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment." Include the following:	1.4.A													
778			23 51 00		Manufacturer Seismic Qualification Certification	Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation	1.4.A.1													
779			23 51 00		Manufacturer Seismic Qualification Certification	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."	1.4.A.1.a													
780			23 51 00		Manufacturer Seismic Qualification Certification	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 and the unit will be fully operational after the seismic event."	1.4.A.1.b													
781			23 51 00		Manufacturer Seismic Qualification Certification	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 and the unit will be fully operational after the seismic event."	1.4.A.1.c													
782			23 51 00		Manufacturer Seismic Qualification Certification	Detailed description of anchorage devices on which the certification is based and their installation requirements.	1.4.A.2													
783			23 51 00		Warranty	Special warranty specified in this Section.	1.4.B													
784			23 55 23		Product Data	For each type of gas-fired radiant heater indicated. Include rated capacities, operating characteristics, and accessories.	1.2.A													
785			23 55 23		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.	1.2.B													
786			23 55 23		Shop Drawings	Wiring Diagrams: Power, signal, and control wiring	1.2.B.1													
787			23 55 23		Field quality-control test reports	Field quality-control test reports	1.3													
788			23 55 23		Operation and maintenance data.	Operation and maintenance data.	1.4													

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789			23 55 23		Special Warranty:	Manufacturer's standard form in which manufacturer agrees to repair or replace components of gas-fired radiant heater that fails in materials or workmanship within specified warranty period.	1.6.A													
790			23 55 23		Special Warranty:	Warranty Period: Three years from date of Substantial Completion	1.6.A.1													
791			23 74 13		Product Data	Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.	1.4.A													
792			23 74 13		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.	1.4.B													
793			23 74 13		Shop Drawings	Wiring Diagrams: Power, signal, and control wiring	1.4.B.1													
794			23 74 13		Field quality-control test reports	Field quality-control test reports	1.5.A													
795			23 74 13		Warranty	Warranty	1.5.A													
796			23 74 13		Operation and maintenance data	Operation and maintenance data	1.6.A													
797			23 74 33		Product Data	Include rated capacities, furnished specialties, and accessories.	1.2.A													
798			23 74 33		Shop Drawings	Include details of installation and wiring diagrams.	1.2.B													
799			23 74 33		Startup service reports	Startup service reports	1.2.C													
800			23 74 33		Operation and maintenance data	Operation and maintenance data	1.2.D													
801			23 74 33		Special Warranty	Manufacturer's standard form in which manufacturer agrees to replace components listed below that fail in materials or workmanship within specified warranty period.	1.4.A													
802			23 74 33		Special Warranty	Warranty Period for Heat Exchangers: Manufacturer's standard, but not less than five years from date of Substantial Completion.	1.4.A.1													
803			23 81 26		Product Data	For each type of product indicated	1.2.A													
804			23 81 26		Shop Drawings	Include plans, elevations, sections, details, and attachments to other work	1.2.B													
805			23 81 26		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.	1.2.B.1													
806			23 81 26		Warranty	Sample of special warranty	1.3.A													
807			23 81 26		Operation and maintenance data	Operation and maintenance data	1.4.A													

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808			26 01 00		General	Unless otherwise indicated, all submittals shall be made in accordance with requirements as specified herein and in Division 1 Section Submittal Procedures	1.5.A.													
809			26 01 00		Material lists and Shop drawing	All material lists and shop drawing submittals shall include a stamped indication signifying that the submittals have been previously reviewed for compliance with the Trade Contract Documents, that all coordination required prior to field installation has occurred and that the material being submitted is approved for installation. The stamped indication shall include the name of the Contracting Firm, the date of the review and the signature of the Trade Contractor. The Engineer will not review the shop drawing submittals without the Trade Contractors stamped approval on the shop drawings. The responsibility of complying with the Trade Contract Documents shall not be relieved by the Engineer's review and comments. The Engineer's review requires not less than two (2) weeks from date the shop drawings are received by the Engineer. Submittals for equipment specified in each Section, with the exception of samples, shall be bound and submitted as a complete package. The submittal may be included in more than one volume. However, the submittal shall be separated into groups of types of equipment as follows:	1.5.B														
810			26 01 00		Material lists and Shop drawing	Group I – Devices	1.5.B.1													
811			26 01 00		Material lists and Shop drawing	Group II - Switchgear:	1.5.B.2													
812			26 01 00		Material lists and Shop drawing	Group III - Lighting	1.5.B.3													
813			26 01 00		Material lists and Shop drawing	Group IV - Systems	1.5.B.4													
814			26 01 00		Material lists and Shop drawing	Group V - Wire	1.5.B.5													
815			26 01 00		Material lists and Shop drawing	Group VI - Emergency Systems	1.5.B.6													
816			26 01 00		Material lists and Shop drawing	Group VI – Division 27 Communications	1.5.B.7													
817			26 01 00		Material lists and Shop drawing	Group VIII – Division 28 Electronic Safety and Security Systems	1.5.B.8													
818			26 01 00		Product Data:	Manufacturers technical product literature, including specifications and installation instructions for each component and system as listed in Products, Part 2, of each section.	1,5,C													

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819			26 01 00		Shop Drawings	Dimensioned drawings and layouts showing location of system components, accessories and secondary systems. Include wiring diagrams, connections and special installation details.	1.5.D													
820			26 01 00		Coordination Drawings	Detailed layout drawings showing primary elements, components and systems of electrical equipment and materials in relationship with other building components.	1.5.E													
821			26 01 00		Coordination Drawings	Indicate clearances for servicing and maintaining equipment	1.5.E.1													
822			26 01 00		Coordination Drawings	Indicate locations where space is limited and sequencing and coordination will affect efficient installation of the Work.	1.5.E.2													
823			26 01 00		Quality Control Submittals	Provide the following for record	1.5.F													
824			26 01 00		Quality Control Submittals	Test Reports	1.5.F.1													
825			26 01 00		Quality Control Submittals	Certificates	1.5.F.2													
826			26 01 00		Quality Control Submittals	Manufacturers Instructions	1.5.F.3													
827			26 01 00		Quality Control Submittals	Manufacturers Field Reports	1.5.F.4													
828			26 01 00		Trade Contract Close-out Submittals:	Provide tab pages with metal or plastic reinforced holes to separate each major item or closely related group of items with typed item names on the tabs. Supply a table of contents at the beginning of each volume listing all items, the manufacturers and the name, address and phone number of the nearest authorized service representative. In addition to operation, maintenance and lubrication instructions, the manuals shall include the following:	1.5.G													
829			26 01 00		Trade Contract Close-out Submittals:	Parts lists	1.5.G.1													
830			26 01 00		Trade Contract Close-out Submittals:	Power and control wiring diagrams	1.5.G.2													
831			26 01 00		Trade Contract Close-out Submittals:	Elementary or schematic wiring diagrams	1.5.G.3													
832			26 01 00		Trade Contract Close-out Submittals:	Manufacturers recommended tightening torque for connections where applicable	1.5.G.4													

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833			26 01 00		Project Record Documents	Furnish project record documents in accordance with General Conditions and Division 1. Include marked up as-built drawings indicating proper circuit numbers, conduit homeruns, branch conduit runs, and other such pertinent data. Mark the actual installed depths of all buried electrical conduit or cable and show the measured horizontal distance from permanent construction, such as building walls. Especially mark where any riser conduit occurs. Include the following:	1.5.H														
834			26 01 00		Project Record Documents	"As-built" conduit layout diagrams, including wire color code and/or tag number.	1.5.H.1													
835			26 01 00		Project Record Documents	Complete "as-built" wiring diagrams.	1.5.H.2													
836			26 01 00		Project Record Documents	Detailed catalog data on all installed system components	1.5.H.3													
837			26 01 00		Project Record Documents	Copy of the test reports described elsewhere	1.5.H.4													
838			26 01 00		Operation and maintenance data warranty	Provide three copies at time of Final Completion in accordance with the General Conditions and Division 01. Use multiple binders if a single binder would exceed 2-1/2" in thickness. Arrange the data in the same sequence as the specification Section. Delete or mark through extraneous data. Before final acceptance of work, the Trade Contractor shall deliver the composite "Operating and Shop Maintenance Manual." Each manual shall contain, but not be limited to	1.5.I													
839			26 01 00		Operation and maintenance data warranty	A statement of guarantee, including date of termination and name and phone number of the person to be called in event of equipment failure.	1.5.I.1													
840			26 01 00		Operation and maintenance data warranty	Individual factory-issued manuals containing all technical information on each piece of equipment installed. In the event such manuals are not obtainable from the factory, it shall be the responsibility of the Trade Contractor to compile and include them. Advertising brochures or operational instructions shall not be used in lieu of the required technical manuals.	1.5.I.2													
841			26 05 00		Product Data	For sleeve seals	1.4.A													
842			26 05 13.19		Product Data	For each type of cable. Include splices and terminations for cables and cable accessories.	1.3.A													

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843			26 05 13.19		Samples	16-inch lengths for each type of cable specified	1.3.B													
844			26 05 13.19		Qualification Data	For Installer and testing agency	1.4.A													
845			26 05 13.19		Material Certificates	For each type of cable and accessory	1.4.B													
846			26 05 13.19		Source quality-control reports.	Source quality-control reports.	1.4.C													
847			26 05 13.19		Field quality-control reports	Field quality-control reports	1.4.D													
848			26 05 19		Product Data	For each type of product indicated	1.4.A													
849			26 05 19		Qualification Data	For testing agency	1.5.A													
850			26 05 19		Field quality-control test reports.	Field quality-control test reports.	1.5.B													
851			26 05 26		Product Data	For each type of product indicated	1.3.A													
852			26 05 26		Informational Submittals	Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following	1.4.A													
853			26 05 26		Informational Submittals	Test wells.	1.4.A.1													
854			26 05 26		Informational Submittals	Ground rods	1.4.A.2													
855			26 05 26		Informational Submittals	Ground rings	1.4.A.3													
856			26 05 26		Informational Submittals	Grounding arrangements and connections for separately derived systems.	1.4.A.4													
857			26 05 26		Field quality-control reports.	Field quality-control reports.	1.4.B													
858			26 05 26		Operation and Maintenance Data:	For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:	1.5.A													
859			26 05 26		Operation and Maintenance Data:	Instructions for periodic testing and inspection of grounding features at test wells, ground rings and grounding connections for separately derived systems based on NFPA 70B.	1.5.A.1													
860			26 05 26		Operation and Maintenance Data:	Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.	1.5.A.1.a													
861			26 05 26		Operation and Maintenance Data:	Include recommended testing intervals	1.5.A.1.b													
862			26 05 33		Product Data	For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.	1.4.A													
863			26 05 33		Shop Drawings	For the following raceway components. Include plans, elevations, sections, details, and attachments to other work	1.4.B													
864			26 05 33		Shop Drawings	Custom enclosures and cabinets.	1.4.B.1													
865			26 05 33		Shop Drawings	For handholes and boxes for underground wiring, including the following	1.4.B.2													
866			26 05 33		Shop Drawings	Duct entry provisions, including locations and duct sizes.	1.4.B.2.a													

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867			26 05 33		Shop Drawings	Frame and cover design	1.4.B.2.b													
868			26 05 33		Shop Drawings	Grounding details	1.4.B.2.c													
869			26 05 33		Shop Drawings	Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.	1.4.B.2.d													
870			26 05 33		Shop Drawings	Joint details	1.4.B.2.e													
871			26 05 33		Coordination Drawings	Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:	1.4.C													
872			26 05 33		Coordination Drawings	Structural members in the paths of conduit groups with common supports.	1.4.C.1													
873			26 05 33		Coordination Drawings	HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.	1.4.C.2													
874			26 05 33		Source quality-control test reports	Source quality-control test reports	1.4.D													
875			26 05 43.13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
876			26 05 43.13		Submission of the method proposed for removal of materials from conduits.	Submission of the method proposed for removal of materials from conduits.	1.2.B													
877			26 05 48		Product Data:	For the following	1.5.A													
878			26 05 48		Product Data:	Include rated load, rated deflection, and overload capacity for each vibration isolation device.	1.5.A.1													
879			26 05 48		Product Data:	Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.	1.5.A.2													
880			26 05 48		Product Data:	Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES.	1.5.A.2.a													
881			26 05 48		Product Data:	Annotate to indicate application of each product submitted and compliance with requirements.	1.5.A.2.b													
882			26 05 48		Product Data:	Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads	1.5.A.3													
883			26 05 48		Delegated-Design Submittal	For vibration isolation and seismic-restraint details 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.B													

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884			26 05 48		Delegated-Design Submittal	Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.	1.5.B.1													
885			26 05 48		Delegated-Design Submittal	Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other Division 26 Sections for equipment mounted outdoors.	1.5.B.1.a													
886			26 05 48		Delegated-Design Submittal	Indicate materials and dimensions and identify hardware, including attachment and anchorage devices	1.5.B.2													
887			26 05 48		Delegated-Design Submittal	Field-fabricated supports.	1.5.B.3													
888			26 05 48		Delegated-Design Submittal	Seismic-Restraint Details	1.5.B.4													
889			26 05 48		Delegated-Design Submittal	Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.	1.5.B.4.a													
890			26 05 48		Delegated-Design Submittal	Details: Indicate 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. Indicate association with vibration isolation devices.	1.5.B.4.b													
891			26 05 48		Coordination Drawings:	Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.	1.6.A													
892			26 05 48		Qualification Data:	For professional engineer	1.6.B													
893			26 05 48		Welding certificates.	Welding certificates.	1.6.C													
894			26 05 48		Field quality-control test reports.	Field quality-control test reports.	1.6.D													
895			26 05 73		Product Data:	For computer software program to be used for studies	1.3.A													
896			26 05 73		Other Action Submittals	The following submittals shall be made after the approval process for system protective devices has been completed. Submittals may be in digital form.	1.3.B													
897			26 05 73		Other Action Submittals	Coordination-study input data, including completed computer program input data sheets.	1.3.B.1													
898			26 05 73		Other Action Submittals	Study and Equipment Evaluation Reports	1.3.B.2													
899			26 05 73		Other Action Submittals	Coordination-Study Report.	1.3.B.3													
900			26 05 73		Qualification Data	For coordination-study specialist	1.4.A													

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901			26 05 73		Product Certificates	For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.	1.4.B													
902			26 08 00		Submittals	In accordance with the requirements of Sections 01 33 00 Submittal Procedures , 01 33 00.13 Document Control and 01 78 30 Warranties and Bonds.	1.5.A													
903			26 08 00		Testing qualifications	Submit the testing company's qualifications and the resumes of the personnel proposed to be assigned to this Project.	1.5.B													
904			26 08 00		Test Procedures	Fixed test procedures as recommended by the equipment/system manufacturer.	1.5.C													
905			26 08 00		Testing Program	Submit proposed testing program and test procedures for review and approval by the CM/GC before beginning any testing thirty (30) days before any testing is conducted. Each procedure shall include the following as a minimum:	1.5.D													
906			26 08 00		Testing Program	Statement of procedure objective and scope.	1.5.D.1													
907			26 08 00		Testing Program	List of equipment required to set up and perform the procedure	1.5.D.2													
908			26 08 00		Testing Program	List of equipment or services required from areas outside Trade Contractor's control.	1.5.D.3													
909			26 08 00		Testing Program	List of prerequisite tests that need to be completed before the procedure can be performed	1.5.D.4													
910			26 08 00		Testing Program	Description of the required procedure setup, including diagrams illustrating test equipment connections and identifying test points, where applicable.	1.5.D.5													
911			26 08 00		Testing Program	Step-by-step instructions for performing the procedure identifying the points where data is to be recorded and the limits for acceptable data, in accordance with referenced standards	1.5.D.6													
912			26 08 00		Testing Program	Provisions for recording pertinent test conditions and environment at time of test.	1.5.D.7													
913			26 08 00		Testing Program	Instructions for recording data on data sheets and verifying that procedure steps have been completed.	1.5.D.8													
914			26 08 00		Test Report (Draft and Final)		1.5.E													
915			26 08 00		Test Report (Draft and Final)	The draft and final test reports, shall include, but not be limited to, the following	1.5.E.1													
916			26 08 00		Test Report (Draft and Final)	Summary of Project.	1.5.E.1.a													

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917			26 08 00		Test Report (Draft and Final)	Description of equipment tested	1.5.E.1.b													
918			26 08 00		Test Report (Draft and Final)	Description of test.	1.5.E.1.c													
919			26 08 00		Test Report (Draft and Final)	List of test equipment used in calibration and calibration date.	1.5.E.1.d													
920			26 08 00		Test Report (Draft and Final)	Test results, including plots/graphs and actual readings/measurements taken including corrected values.	1.5.E.1.e													
921			26 08 00		Test Report (Draft and Final)	Conclusions and recommendations.	1.5.E.1.f													
922			26 08 00		Test Report (Draft and Final)	Appendix, including appropriate test forms.	1.5.E.1.g													
923			26 08 00		Test Report (Draft and Final)	All test reports shall be signed by the CM/GC's authorized witness present at the test.	1.5.E.1.h													
924			26 08 00		Test Report (Draft and Final)	The final test report shall be bound and its contents certified	1.5.E.2													
925			26 08 00		Test Report (Draft and Final)	Furnish ten copies of the completed final test report to the CM/GC no later than 15 days after completion of the inspection and testing.	1.5.E.3													
926			26 08 00		Instruments:	Submit list of instruments and certification indicating that instruments that will be used for testing have been calibrated and their accuracy certified within a previous period of not more than one month. List types of instruments to be used, manufacturer, model, serial number, latest date of calibration, and calibration organization.	1.5.F													
927			26 09 23		Product Data	For each type of product.	1.3.A													
928			26 09 23		Shop Drawings	Show installation details for occupancy and light-level sensors.	1.3.B													
929			26 09 23		Shop Drawings	Interconnection diagrams showing field-installed wiring.	1.3.B.1													
930			26 09 23		Shop Drawings	Include diagrams for power, signal, and control wiring	1.3.B.2													
931			26 09 23		Field quality-control reports.	Field quality-control reports.	1.4.A													
932			26 09 23		Operation and Maintenance Data:	For each type of lighting control device to include in emergency, operation, and maintenance manuals.	1.5.A													
933			26 12 00		Product Data	Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, location of each field connection, and performance for each type and size of transformer indicated.	1.4.A													
934			26 12 00		Shop Drawings	Diagram power and control wiring	1.4.B													
935			26 12 00		Coordination Drawings	Floor plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:	1.5.A													

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936			26 12 00		Coordination Drawings	Underground primary and secondary conduit stub-up location	1.5.A.1													
937			26 12 00		Coordination Drawings	Dimensioned concrete base, outline of transformer, and required clearances	1.5.A.2													
938			26 12 00		Coordination Drawings	Ground rod and grounding cable locations	1.5.A.3													
939			26 12 00		Coordination Drawings	Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions	1.5.A.4													
940			26 12 00		Coordination Drawings	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.	1.5.A.5													
941			26 12 00		Source quality-control test reports	Source quality-control test reports	1.5.B													
942			26 12 00		Field quality-control test reports.	Field quality-control test reports.	1.5.C													
943			26 12 00		Follow-up service reports	Follow-up service reports	1.5.D													
944			26 12 00		Operation and Maintenance Data	For transformer and accessories to include in emergency, operation, and maintenance manuals.	1.6.A													
945			26 13 00		Product Data	For each type of switchgear and related equipment, include the following:	1.4													
946			26 13 00		Product Data	Rated capacities, operating characteristics, furnished specialties, and accessories for individual interrupter switches.	1.4.1													
947			26 13 00		Product Data	Time-current characteristic curves for overcurrent protective devices, including fusible devices.	1.4.2													
948			26 13 00		Shop Drawings	For each type of switchgear and related equipment, include the following:	1.4.B													
949			26 13 00		Shop Drawings	Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show method of field assembly and location and size of each field connection. Include the following:	1.4.B.1													
950			26 13 00		Shop Drawings	Tabulation of installed devices with features and ratings.	1.4.B.1.a													
951			26 13 00		Shop Drawings	Outline and general arrangement drawing showing dimensions, shipping sections, and weights of each assembled section.	1.4.B.1.b													
952			26 13 00		Shop Drawings	Drawing of cable termination compartments showing preferred locations for conduits and indicating space available for cable terminations.	1.4.B.1.c													
953			26 13 00		Shop Drawings	Floor plan drawing showing locations for anchor bolts and leveling channels	1.4.B.1.d													
954			26 13 00		Shop Drawings	Current ratings of buses.	1.4.B.1.e													

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955			26 13 00		Shop Drawings	Short-time and short-circuit ratings of switchgear assembly.	1.4.B.1.f													
956			26 13 00		Shop Drawings	Nameplate legends	1.4.B.1.g													
957			26 13 00		Shop Drawings	Wiring Diagrams: For each type of switchgear and related equipment, include the following:	1.4.B.2													
958			26 13 00		Shop Drawings	Power, signal, and control wiring.	1.4.B.2.a													
959			26 13 00		Shop Drawings	Three-line diagrams of secondary circuits showing device terminal numbers and internal diagrams.	1.4.B.2.b													
960			26 13 00		Shop Drawings	Schematic control diagrams.	1.4.B.2.c													
961			26 13 00		Shop Drawings	Diagrams showing connections of component devices and equipment.	1.4.B.2.d													
962			26 13 00		Coordination Drawings	Floor plans showing dimensioned layout, required working clearances, and required area above and around switchgear where piping and ducts are prohibited. Show switchgear layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Identify field measurements.	1.4.C													
963			26 13 00		Source quality-control test reports.	Source quality-control test reports.	1,4,D													
964			26 13 00		Field quality-control test reports.	Field quality-control test reports.	1.4.E													
965			26 13 00		Operation and Maintenance Data:	For switchgear and switchgear components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:	1.4.F													
966			26 13 00		Operation and Maintenance Data:	Manufacturer's written instructions for testing and adjusting overcurrent protective devices.	1.4.F.1													
967			26 13 00		Operation and Maintenance Data:	Time-current curves, including selectable ranges for each type of overcurrent protective device.	1.4.F.2													
968			26 22 00		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.A													
969			26 22 00		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.	1.3.B													
970			26 22 00		Shop Drawings	Wiring Diagrams: Power, signal, and control wiring.	1.3.B.1													

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971			26 22 00		Dimensioned Outline Drawings of Equipment Unit	Identify center of gravity and locate and describe mounting and anchorage provisions.	1.4.A													
972			26 22 00		equipment anchorage devices	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.	1.4.B													
973			26 22 00		Source quality-control test reports.	Source quality-control test reports.	1.4.C													
974			26 22 00		Field quality-control test reports.	Field quality-control test reports.	1.4.D													
975			26 22 00		Operation and Maintenance Data:	For transformers to include in emergency, operation, and maintenance manuals.	1.5.A													
976			26 24 16		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.	1.4.A													
977			26 24 16		Shop Drawings	For each panelboard and related equipment	1.4.B													
978			26 24 16		Shop Drawings	Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.	1.4.B.1													
979			26 24 16		Shop Drawings	Detail enclosure types and details for types other than NEMA 250, Type 1.	1.4.B.2													
980			26 24 16		Shop Drawings	Detail bus configuration, current, and voltage ratings.	1.4.B.3													
981			26 24 16		Shop Drawings	Short-circuit current rating of panelboards and overcurrent protective devices.	1.4.B.4													
982			26 24 16		Shop Drawings	Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.	1.4.B.5													
983			26 24 16		Field Quality-Control Reports:	Field Quality-Control Reports:	1.5.A													
984			26 24 16		Field Quality-Control Reports:	Test procedures used.	1.5.A.1													
985			26 24 16		Field Quality-Control Reports:	Test results that comply with requirements.	1.5.1.2													
986			26 24 16		Field Quality-Control Reports:	Results of failed tests and corrective action taken to achieve test results that comply with requirements.	1.5.A.3													
987			26 24 16		Operation and Maintenance Data	For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:	1.6.A													

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988			26 24 16		Operation and Maintenance Data	Manufacturer's written instructions for testing and adjusting overcurrent protective devices.	1.6.A.1													
989			26 24 16		Operation and Maintenance Data	Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.	1.6.A.2													
990			26 27 13		Product Data	For each type of product indicated.	1.4.A													
991			26 27 13		Shop Drawings	For electricity-metering equipment.	1.4.B													
992			26 27 13		Shop Drawings	Dimensioned plans and sections or elevation layouts.	1.4.B.1													
993			26 27 13		Shop Drawings	Wiring Diagrams: For power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features.	1.4.B.2													
994			26 27 13		Field quality-control reports.	Field quality-control reports.	1.5.A													
995			26 27 13		Operation and Maintenance Data	In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:	1.6.A													
996			26 27 13		Operation and Maintenance Data	Application and operating software documentation.	1.6.A.1													
997			26 27 13		Operation and Maintenance Data	Software licenses.	1.6.A.2													
998			26 27 13		Operation and Maintenance Data	Software service agreement.	1.6.1.3													
999			26 27 13		Operation and Maintenance Data	Hard copies of manufacturer's operating specifications, design user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy Submittal.	1.6.1.4													
1,000			26 27 26		Product Data	For each type of product	1.5.A													
1,001			26 27 26		Shop Drawings:	List of legends and description of materials.	1.5.B													
1,002			26 27 26		Field quality-control reports.	Field quality-control reports.	1.6.A													
1,003			26 27 26		Operation and Maintenance Data	For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.	1.7.A													
1,004			26 28 13		Product Data	For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:	1.3.A													
1,005			26 28 13		Product Data	Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.	1.3.A.1													

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1,006			26 28 13		Product Data	For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.	1.3.A.1.a													
1,007			26 28 13		Product Data	Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.	1.3.A.1.b													
1,008			26 28 13		Product Data	Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.	1.3.A.2													
1,009			26 28 13		Product Data	Current-limitation curves for fuses with current-limiting characteristics.	1.3.A.3													
1,010			26 28 13		Product Data	Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.	1.3.A.4													
1,011			26 28 13		Product Data	Coordination charts and tables and related data.	1.3.A.5													
1,012			26 28 13		Operation and Maintenance Data:	For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:	1.4.A													
1,013			26 28 13		Operation and Maintenance Data:	Ambient temperature adjustment information	1.4.A.1													
1,014			26 28 13		Operation and Maintenance Data:	Current-limitation curves for fuses with current-limiting characteristics.	1.4.A.2													
1,015			26 28 13		Operation and Maintenance Data:	Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse	1.4.A.3													
1,016			26 28 13		Operation and Maintenance Data:	Coordination charts and tables and related data	1.4.A.4													
1,017			26 28 13		Maintenance Materials	Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.	1.5.A													
1,018			26 28 13		Maintenance Materials	Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.	1.5.A.1													
1,019			26 28 16		Product Data:	For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.	1.4.A													

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1,020			26 28 16		Product Data:	Enclosure types and details for types other than NEMA 250, Type 1	1.4.A.1													
1,021			26 28 16		Product Data:	Current and voltage ratings	1.4.A.2													
1,022			26 28 16		Product Data:	Short-circuit current ratings (interrupting and withstand, as appropriate)	1.4.A.3													
1,023			26 28 16		Product Data:	Include evidence of NRTL listing for series rating of installed devices.	1.4.A.4													
1,024			26 28 16		Product Data:	Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.	1.4.A.5													
1,025			26 28 16		Product Data:	Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device	1.4.A.6													
1,026			26 28 16		Shop Drawings	For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.	1.4.B													
1,027			26 28 16		Shop Drawings	Wiring Diagrams: For power, signal, and control wiring	1.4.B.1													
1,028			26 28 16		Field quality-control reports		1.5.A													
1,029			26 28 16		Field quality-control reports	Test procedures used	1.5.A.1													
1,030			26 28 16		Field quality-control reports	Test results that comply with requirements.	1.5.A.2													
1,031			26 28 16		Field quality-control reports	Results of failed tests and corrective action taken to achieve test results that comply with requirements.	1.5.A.3													
1,032			26 28 16		Manufacturer's field service report	Manufacturer's field service report	1.5.B													
1,033			26 28 16		Operation and Maintenance Data:	For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:	1.6.A													
1,034			26 28 16		Operation and Maintenance Data:	Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers	1.6.A.1													
1,035			26 28 16		Operation and Maintenance Data:	Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device	1.6.A.2													

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1,036			26 32 13		Product Data	For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:	1.4.A													
1,037			26 32 13		Product Data	Thermal damage curve for generator	1.4.A.1													
1,038			26 32 13		Product Data	Time-current characteristic curves for generator protective device	1.4.A.2													
1,039			26 32 13		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	1.4.B													
1,040			26 32 13		Shop Drawings:	Dimensioned outline plan and elevation drawings of engine-generator set and other components specified	1.4.B.1													
1,041			26 32 13		Shop Drawings:	Design Calculations: Signed and sealed by a qualified professional engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases	1.4.B.2													
1,042			26 32 13		Shop Drawings:	Wiring Diagrams: Power, signal, and control wiring	1.4.B.3													
1,043			26 32 13		Qualification Data:	For installer and manufacturer	1.5.A													
1,044			26 32 13		Source quality-control test reports		1.5.B													
1,045			26 32 13		Source quality-control test reports	Certified summary of prototype-unit test report	1.5.B.1													
1,046			26 32 13		Source quality-control test reports	Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit	1.5.B.2													
1,047			26 32 13		Source quality-control test reports	Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads	1.5.B.3													
1,048			26 32 13		Source quality-control test reports	Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements	1.5.B.4													
1,049			26 32 13		Source quality-control test reports	Report of sound generation	1.5.B.5													
1,050			26 32 13		Source quality-control test reports	Report of exhaust emissions showing compliance with applicable regulations	1.5.B.6													
1,051			26 32 13		Source quality-control test reports	Certified Torsional Vibration Compatibility: Comply with NFPA 110	1.5.B.7													
1,052			26 32 13		Field quality-control test reports	Field quality-control test reports	1.5.C													
1,053			26 32 13		Warranty: Special warranty specified in this Section	Warranty: Special warranty specified in this Section	1.5.D													

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1,054			26 32 13		Operation and Maintenance Data:	For packaged engine generators to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following	1.6.A													
1,055			26 32 13		Operation and Maintenance Data:	List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply	1.6.A.1													
1,056			26 33 53		Product Data	For each type of product indicated. Include data on features, components, ratings, and performance	1.5.A													
1,057			26 33 53		Shop Drawings	For UPS. Include plans, elevations, sections, details, and attachments to other work.	1.5.B													
1,058			26 33 53		Shop Drawings	Detail equipment assemblies and indicate dimensions, weights, components, and location and identification of each field connection. Show access, workspace, and clearance requirements; details of control panels; and battery arrangement.	1.5.B.1													
1,059			26 33 53		Shop Drawings	Wiring Diagrams: For power, signal, and control wiring	1.5.B.2													
1,060			26 33 53		Qualification Data:	For qualified testing agency.	1.6.A													
1,061			26 33 53		Seismic Qualification Certificates	For UPS equipment, from manufacturer	1.6.B													
1,062			26 33 53		Seismic Qualification Certificates	Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation	1.6.B.1													
1,063			26 33 53		Seismic Qualification Certificates	Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions	1.6.B.2													
1,064			26 33 53		Seismic Qualification Certificates	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements	1.6.B.3													
1,065			26 33 53		Manufacturer Certificates	For each product, from manufacturer	1.6.C													
1,066			26 33 53		Factory Test Reports:	Comply with specified requirements.	1.6.D													
1,067			26 33 53		Field quality-control reports.	Field quality-control reports.	1.6.E													
1,068			26 33 53		Performance Test Reports:	Indicate test results compared with specified performance requirements, and provide justification and resolution of differences if values do not agree	1.6.F													
1,069			26 33 53		Warranties	Sample of special warranties	1.6.G													
1,070			26 33 53		Operation and Maintenance Data:	For UPS units to include in emergency, operation, and maintenance manuals.	1.7.A													

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1,071			26 33 53		Operation and Maintenance Data:	Cabinet Ventilation Filters: One complete set(s)	1.7.A.1													
1,072			26 36 00		Product Data	For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories	1.3.A													
1,073			26 36 00		Shop Drawings:	Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified	1.3.B													
1,074			26 36 00		Shop Drawings:	Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch	1.3.B.1													
1,075			26 36 00		Qualification Data	For manufacturer	1.4.A													
1,076			26 36 00		Field quality-control test reports	Field quality-control test reports	1.4.B													
1,077			26 36 00		Operation and Maintenance Data:	For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following	1.5.A													
1,078			26 36 00		Operation and Maintenance Data:	Features and operating sequences, both automatic and manual	1.4.A.1													
1,079			26 36 00		Operation and Maintenance Data:	List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable	1.4.A.2													
1,080			26 41 13		Product Data	For each type of product indicated	1.3.A													
1,081			26 41 13		Shop Drawings	For air terminals and mounting accessories.	1.3.B													
1,082			26 41 13		Shop Drawings	Layout of the lightning protection system, along with details of the components to be used in the installation	1.3.B.1													
1,083			26 41 13		Shop Drawings	Include indications for use of raceway, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding of grounded and isolated metal bodies	1.3.B.2													
1,084			26 41 13		Qualification Data	For qualified Installer and manufacturer. Include data on listing or certification by UL	1.4.A													
1,085			26 41 13		Certification,	signed by Trade Contractor, that roof adhesive is approved by manufacturer of roofing material	1.4.B													
1,086			26 41 13		Field quality-control reports	Field quality-control reports	1.4.C													

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1,087			26 41 13		lightning protection system	Comply with recommendations in NFPA 780, Annex D, "Inspection and Maintenance of Lightning Protection Systems," for maintenance of the lightning protection system	1.4.D													
1,088			26 41 13		Plans	Plans showing dimensioned as-built locations of grounding features, including the following:	1.4.E													
1,089			26 41 13		Plans	Ground rods	1.4.E.1													
1,090			26 41 13		Plans	Ground loop conductor	1.4.E.2													
1,091			26 51 00		Product Data	For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following	1.4.A													
1,092			26 51 00		Product Data	Physical description of lighting fixture including dimensions	1.4.A.1													
1,093			26 51 00		Product Data	Emergency lighting units including battery and charger	1.4.A.2													
1,094			26 51 00		Product Data	Ballast, including BF	1.4.A.3													
1,095			26 51 00		Product Data	Energy-efficiency data	1.4.A.4													
1,096			26 51 00		Product Data	Air and Thermal Performance Data: For air-handling lighting fixtures. Furnish data required in "Action Submittals" Article in Division 23 Section "Diffusers, Registers, and Grilles.	1.4.A.5													
1,097			26 51 00		Product Data	Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps	1.4.A.6													
1,098			26 51 00		Product Data	Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project	1.4.A.7													
1,099			26 51 00		Product Data	Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products	1.4.A.7.1													
1,100			26 51 00		Shop Drawings	For nonstandard or custom lighting fixtures. Include plans, elevations, sections, details, and attachments to other work	1.4.B													
1,101			26 51 00		Product Data	Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection	1.4.B.1													

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1,102			26 51 00		Product Data	Wiring Diagrams: For power, signal, and control wiring	1.4.B.2													
1,103			26 51 00		Installation instructions	Installation instructions	1.4.C													
1,104			26 51 00		Qualification Data:	For qualified agencies providing photometric data for lighting fixtures	1.4.D													
1,105			26 51 00		Product Certificates:	For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer	1.4.E													
1,106			26 51 00		Field quality-control reports	Field quality-control reports	1.4.F													
1,107			26 51 00		Warranty:	Sample of special warranty	1.4.G													
1,108			26 51 00		Operation and Maintenance Data	For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals	1.5.A													
1,109			26 51 00		Operation and Maintenance Data	Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes	1.5.A.1													
1,110			26 56 26		Section 01 33 00 and 01 33 00.13	Submit the following in accordance with Section 01 33 00 Submittal Procedures and 01 33 00.13 Document Control	1.5.A													
1,111			26 56 26		Product Data	For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following	1.5.B													
1,112			26 56 26		Product Data	Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters	1.5.B.1													
1,113			26 56 26		Product Data	Details of attaching luminaires and accessories	1.5.B.2													
1,114			26 56 26		Product Data	Details of installation and construction	1.5.B.3													
1,115			26 56 26		Product Data	Luminaire materials	1.5.B.4													
1,116			26 56 26		Product Data	Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories	1.5.B.5													
1,117			26 56 26		Product Data	Ballasts, including energy-efficiency data	1.5.B.6													
1,118			26 56 26		Product Data	Lamps, including life, output, CCT, CRI, lumens and energy-efficient data	1.5.B.7													
1,119			26 56 26		Product Data	Materials, dimensions, and finishes of poles	1.5.B.8													
1,120			26 56 26		Product Data	Means of attaching luminaires to supports, and indication that attachment is suitable for components involved	1.5.B.9													
1,121			26 56 26		Product Data	Anchor bolts for poles	1.5.B.10													
1,122			26 56 26		Product Data	Manufactured pole foundations	1.5.B.11													
1,123			26 56 26		Shop drawings	Include plans, elevations, sections, details, and attachments to other work	1.5.C													
1,124			26 56 26		Pole and support component certificates	Pole and support component certificates	1.5.D													

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1,125			26 56 26		Maintenance Data	Include operation and maintenance manuals specified in Section 01 78 23 Operation and Maintenance Data	1.5.E													
1,126			26 56 26		Warranties	Special warranties specified in Section 01 78 30, Warranties and Bonds	1.5.F													
1,127			27 01 00		General	Unless otherwise indicated, all submittals shall be made in accordance with requirements as specified herein and in Division 1 Section "Submittal Procedures."	1.5 A													
1,128			27 01 00		General	Transmit each submittal with the proper Transmittal Form specified in the specification Section, Submittal Procedures.	1.5.A.1													
1,129			27 01 00		General	All material lists and shop drawing submittals shall include a stamped or electronically “stamped” indication signifying that the submittals have been previously reviewed for compliance with the Contract Documents, that all coordination required prior to field installation has occurred and that the material being submitted is approved for installation. The stamped indication shall include the name of the Contracting Firm, the date of the review and the signature of the Contractor. The Engineer will not review the shop drawing submittals without the Contractor’s stamped approval on the shop drawings. The Contractor’s responsibility for complying with the Contract Documents shall not be relieved by the Engineer's review and comments. The Engineer's review requires not less than two (2) weeks from date the submittals are received by the Engineer. If more than two submissions are required due to the shop drawings not complying with the specifications, the contractor shall compensate the owner $1000 per instance, until the shop drawings are approved.	1.5.B													

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1,130			27 01 00		Equipment	Submittals for equipment specified in each Section, with the exception of samples, shall be loose-leaf pages, produced as .PDF files, and submitted electronically as a complete package. The submittal may be separated by Group(s) for submission at different times or all at the same time. However, each Group submittal must be 100% complete and submitted at the same time.	1.5.C													
1,131			27 01 00		General	The Engineer's submittal comments will be returned to the Contractor electronically on a Submittal Comments form, .PDF file.	1.5.C.1													
1,132			27 01 00		General	The Engineer will not receive, review or process hard-copy submittals.	1.5.C.2													
1,133			27 01 00		General	The submittal shall be separated by system and tabbed into groups	1.5.D													
1,134			27 01 00		Product Data	Product Data: Manufacturers technical product literature, including specifications and installation instructions for each component and system as listed in Products, Part 2, of each section.	1.5.E													
1,135			27 01 00		Shop Drawings	Shop Drawings: Dimensioned drawings and layouts showing location of system components, accessories and secondary systems. Include wiring diagrams, connections and special installation details.	1.5.F													
1,136			27 01 00		Coordination Drawings	Coordination Drawings: Detailed layout drawings showing primary elements, of components and systems of communications equipment and materials in relationship with other building components.	1.5.G													
1,137			27 01 00		Quality Control Submittals	Quality Control Submittals: Provide the following for record:	1.5.H													
1,138			27 01 00		Quality Control Submittals	Test Reports	1.5.H.1													
1,139			27 01 00		Quality Control Submittals	Certificates.	1.5.H.2													
1,140			27 01 00		Quality Control Submittals	Manufacturers Instructions.	1.5.H.3													
1,141			27 01 00		Quality Control Submittals	Manufacturers Field Reports.	1.5.H.4													

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1,142			27 01 00		Contract Close-Out Submittals	Contract Close-out Submittals: Provide loose-leaf pages, produced as .PDF files, and submitted electronically as a complete package. Tab pages to separate each major item or closely related group of items with typed item names on the tabs. Supply a table of contents at the beginning of each volume listing all items, the manufacturers and the name, address and phone number of the nearest authorized service representative. In addition to operation, maintenance and lubrication instructions, the manuals shall include the following:	1.5.I														
1,143					Contract Close-Out Submittals	Parts list(s).	1.5.I.1													
1,144			27 01 00		Contract Close-Out Submittals	Security System wiring diagrams.	1.5.I.2													
1,145			27 01 00		Contract Close-Out Submittals	Elementary or schematic wiring diagrams	1.5.I.3													
1,146			27 01 00		Programming Sheets	Provide programming sheets for all equipment and devices that is hardware or software configurable in the field. Document all settings, IP addresses to provide a complete record of settings.	1.5.J													
1,147			27 01 00		Project Record Documents	Furnish project record documents in accordance with General Conditions and Division 1. Include marked up as-built drawings indicating proper outlet numbers, conduit homeruns, branch conduit runs, and other such pertinent data. Include the following:	1.5.K													
1,148			27 01 00		Project Record Documents	"As-built" conduit layout diagrams, including wire color code and/or tag number.	1.5.K.1													
1,149					Project Record Documents	Complete "as-built" wiring diagrams.	1.5.K.2													
1,150			27 01 00		Project Record Documents	Detailed catalog data on all installed system components.	1.5.K.3													
1,151			27 01 00		Project Record Documents	Copy of the test reports described elsewhere.	1.5.K.4													

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1,152			27 01 00		Operation and Maintenance Data Warranty	Operation and maintenance data warranty: Provide loose-leaf pages, produced as .PDF files, and furnished electronically as a complete package on compact disc or USB flash drive. Also, provide three copies at time of Final Completion in accordance with the General Conditions and Division 01. Use multiple binders if a single binder would exceed 2-1/2" in thickness. Arrange the data in the same sequence as the specification Section. Delete or mark through extraneous data. Before final acceptance of work, the Contractor shall deliver the composite "Operating and Shop Maintenance Manual." Each manual shall contain, but not be limited to:	1.5.L														
1,153			27 01 00		Operation and Maintenance Data Warranty	A statement of guarantee, including date of termination and name and phone number of the person to be called in event of equipment failure.	1.5.L.1													
1,154			27 01 00		Operation and Maintenance Data Warranty	Individual factory-issued manuals containing all technical information on each piece of equipment installed. In the event such manuals are not obtainable from the factory, it shall be the responsibility of the Contractor to compile and include them. Advertising brochures or operational instructions shall not be used in lieu of the required technical manuals.	1.5.L.2													
1,155			27 05 36		Product Data:	For each type of cable tray	1.3.A													
1,156			27 05 36		Product Data:	Include data indicating dimensions and finishes for each type of cable tray indicated	1.3.A.1													
1,157			27 05 36		Shop Drawings:	For each type of cable tray	1.3.B													
1,158			27 05 36		Shop Drawings:	Show fabrication and installation details of cable trays, including plans, elevations, and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths, and fittings	1.3.B.1													
1,159			27 05 36		Delegated-Design Submittal: For seismic restraints	Delegated-Design Submittal: For seismic restraints	1.3.C													
1,160			27 05 36		Delegated-Design Submittal: For seismic restraints	Seismic-Restraint Details: Signed and sealed by a qualified professional engineer, licensed in the state where Project is located, who is responsible for their preparation	1.3.C.1													

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1,161			27 05 36		Delegated-Design Submittal: For seismic restraints	Design Calculations: Calculate requirements for selecting seismic restraints.	1.3.C.2													
1,162			27 05 36		Delegated-Design Submittal: For seismic restraints	Detail fabrication, including anchorages and attachments to structure and to supported cable trays.	1.3.C.3													
1,163			27 05 36		Coordination Drawings	Floor plans and sections, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved	1.4.A													
1,164			27 05 36		Coordination Drawings	Include scaled cable tray layout and relationships between components and adjacent structural, electrical, and mechanical elements	1.4.A.1													
1,165			27 05 36		Coordination Drawings	Vertical and horizontal offsets and transitions	1.4.A.2													
1,166			27 05 36		Coordination Drawings	Clearances for access above and to side of cable trays	1.4.A.3													
1,167			27 05 36		Coordination Drawings	Vertical elevation of cable trays above the floor or below bottom of ceiling structure	1.4.A.4													
1,168			27 05 36		Seismic Qualification Certificates	For cable trays, accessories, and components, from manufacturer	1.4.B													
1,169			27 05 36		Seismic Qualification Certificates	Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation	1.4.B.1													
1,170			27 05 36		Seismic Qualification Certificates	Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions	1.4.B.2													
1,171			27 05 36		Seismic Qualification Certificates	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements	`1.4.B.3													
1,172			27 05 36		Field quality-control reports	Field quality-control reports	1.4.C													
1,173			27 05 36		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control , for submittal procedures	1.2.A													
1,174			27 05 36		Product Data	Provide manufacturer's literature and catalog cuts for aerial and underground communications cables, aerial and underground fiber optics distribution cable, fiber optic terminations, pole hardware, along with new pole information.	1.2.B													
1,175			27 05 36		Product Certification	Signed by manufacturer of product certifying that products comply with the specified requirements	1.2.C													
1,176			27 05 36		Product Certification	Color combinations for pair identification (aerial and underground communication cable).	1.2.C.1													
1,177			27 11 00		Product Data	For each type of product	1.4.A													

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1,178			27 11 00		Product Data	Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for equipment racks and cabinets	1.4.A.1													
1,179			27 11 00		Product Data	Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories	1.4.A.2													
1,180			27 11 00		Shop Drawings	For communications equipment room fittings. Include plans, elevations, sections, details, and attachments to other work	1.4.B													
1,181			27 11 00		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.	1.4.B.1													
1,182			27 11 00		Shop Drawings	Equipment Racks and Cabinets: Include workspace requirements and access for cable connections	1.4.B.2													
1,183			27 11 00		Shop Drawings	Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets	1.4.B.3													
1,184			27 11 00		Qualification Data	For Installer, qualified layout technician, installation supervisor, and field inspector.	1.5.A													
1,185			27 11 00		Seismic Qualification Certificates	For equipment frames from manufacturer	1.5.B													
1,186			27 11 00		Seismic Qualification Certificates	Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation	1.5.B.1													
1,187			27 11 00		Seismic Qualification Certificates	Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions. Base certification on the maximum number of components capable of being mounted in each rack type. Identify components on which certification is based	1.5.B.2													
1,188			27 11 00		Seismic Qualification Certificates	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements	1.5.B.3													
1,189			27 13 00		Product Data	For each type of product indicated	1.6.A													
1,190			27 13 00		Shop Drawings	Shop Drawings	1.6.B													
1,191			27 13 00		Shop Drawings	System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.	1.6.B.1													

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1,192			27 13 00		Shop Drawings	System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software	1.6.B.2													
1,193			27 13 00		Shop Drawings	Cabling administration drawings and printouts	1.6.B.3													
1,194			27 13 00		Shop Drawings	Wiring diagrams to show typical wiring schematics including the following	1.6.B.4													
1,195			27 13 00		Shop Drawings	Cross-connects	1.6.B.4.a													
1,196			27 13 00		Shop Drawings	Patch panels	1.6.B.4.b													
1,197			27 13 00		Shop Drawings	Patch cords	1.6.B.4.c													
1,198			27 13 00		Shop Drawings	Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed component	1.6.B.5													
1,199			27 13 00		Shop Drawings	Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following	1.6.B.6													
1,200			27 13 00		Shop Drawings	Vertical and horizontal offsets and transitions	1.6.B.6.a													
1,201			27 13 00		Shop Drawings	Clearances for access above and to side of cable trays	1.6.B.6.b													
1,202			27 13 00		Shop Drawings	Vertical elevation of cable trays above the floor or bottom of ceiling structure	1.6.B.6.c													
1,203			27 13 00		Shop Drawings	Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements	1.6.B.6.d													
1,204			27 13 00		Qualification Data:	For Installer, qualified layout technician, installation supervisor, and field inspector.	1.7.A													
1,205			27 13 00		Source quality-control reports	Source quality-control reports	1.7.B													
1,206			27 13 00		Field quality-control reports	Field quality-control reports	1.7.C													
1,207			27 13 00		Maintenance Data	For splices and connectors to include in maintenance manuals	1.7.D													
1,208			27 13 00		Software and Firmware Operational Documentation	Software and Firmware Operational Documentation	1.8.A													
1,209			27 13 00		Software and Firmware Operational Documentation	Software operating and upgrade manuals	1.8.A.1													
1,210			27 13 00		Software and Firmware Operational Documentation	Program Software Backup: On magnetic media or compact disk, complete with data file	1.8.A.2													
1,211			27 13 00		Software and Firmware Operational Documentation	Device address list	1.8.A.3													
1,212			27 13 00		Software and Firmware Operational Documentation	Printout of software application and graphic screens	1.8.A.4													
1,213			27 14 00		Shop Drawings	Shop Drawings	1.5.A													

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1,214			27 14 00		Shop Drawings	Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. Submittals shall include the nameplate data, size, and capacity.	1.5.1														
1,215			27 14 00		Shop Drawings	Provide shop drawings that show the physical and logical connections from the perspective of an entire campus, such as actual building locations, exterior pathways and campus backbone cabling on plan view drawings, major system nodes, and related connections on the logical system drawings in accordance with TIA/EIA-606-A. Drawings shall include wiring and schematic diagrams for fiber optic and copper cabling and splices, copper conductor gauge and pair count, fiber pair count and type, pathway duct and air-blown tube arrangement, associated construction materials, and any details required to demonstrate that cable system has been coordinated and will properly support the switching and transmission system identified in specification and drawings. Provide Registered Communications Distribution Designer (RCDD) approved drawings of the telecommunications outside plant	1.5.2														
1,216			27 14 00		Qualification Data	For Installer, qualified layout technician, installation supervisor, and field inspector.	1.6.A													
1,217			27 14 00		Source quality-control reports	Source quality-control reports	1.6.B													
1,218			27 14 00		Field quality-control reports	Field quality-control reports	1.6.C													
1,219			27 14 00		Maintenance Data	For splices and connectors to include in maintenance manuals	1.6.D													

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1,220			27 14 00		Drawings	Provide drawings including documentation on cables and termination hardware in accordance with TIA/EIA-606-A. Drawings shall include schedules to show information for cut-overs and cable plant management, patch panel layouts, cross-connect information and connecting terminal layout as a minimum. Drawings shall be provided in hard copy format. Provide the following drawing documentation as a minimum	1.7.A														
1,221			27 14 00		Drawings	Cables - A record of installed cable shall be provided in accordance with TIA/EIA-606-A. The cable records shall include the required data fields for each cable and complete end-to-end circuit report for each complete circuit from the assigned outlet to the entry facility in accordance with TIA/EIA-606-A. Include manufacture date of cable with submittal	1.7.A.2														
1,222			27 14 00		Drawings	Termination Hardware - Provide a record of installed patch panels, cross-connect points, campus distributor and terminating block arrangements and type in accordance with TIA/EIA-606-A. Documentation shall include the required data fields as a minimum in accordance with TIA/EIA-606-A	1.7.A.2													
1,223			27 14 00		Drawings	Extra Materials: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents	1.7.A.3													
1,224			27 14 00		Drawings	Protector Modules: 10 of each type	1.7.A.4													
1,225			27 15 00		Product Data:	For each type of product	1.5.A													
1,226			27 15 00		Shop Drawings	Shop Drawings	1.5.B													
1,227			27 15 00		Shop Drawings	System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner	1.5.B.1													
1,228			27 15 00		Shop Drawings	System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software	1.5.B.2													
1,229			27 15 00		Shop Drawings	Cabling administration drawings and printouts	1,5,B,3													
1,230			27 15 00		Shop Drawings	Wiring diagrams to show typical wiring schematics, including the following:	1.5.B.4													
1,231			27 15 00		Shop Drawings	Cross-connects	1.5.B.4.a													
1,232			27 15 00		Shop Drawings	Patch panels	1.5.B.4.b													

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1,233			27 15 00		Shop Drawings	Patch cords	1.5.B.4.c													
1,234			27 15 00		Shop Drawings	Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components	1.5.B.5													
1,235			27 15 00		Qualification Data	For Installer, qualified layout technician, installation supervisor, and field inspector	1.6.A													
1,236			27 15 00		Source quality-control reports.	Source quality-control reports.	1.6.B													
1,237			27 15 00		Field quality-control reports	Field quality-control reports	1.6.C													
1,238			27 15 00		Maintenance Data	For splices and connectors to include in maintenance manuals	1.7.A													
1,239			27 15 00		Software and Firmware Operational Documentation:	Software and Firmware Operational Documentation:	1.7.B													
1,240			27 15 00		Software and Firmware Operational Documentation:	Software operating and upgrade manuals	1.7.B.1													
1,241			27 15 00		Software and Firmware Operational Documentation:	Program Software Backup: On magnetic media or compact disk, complete with data files	1.7.B.2													
1,242			27 15 00		Software and Firmware Operational Documentation:	Device address list	1.7.B.3													
1,243			27 15 00		Software and Firmware Operational Documentation:	Printout of software application and graphic screens	1.7.B.4													
1,244			27 15 00		Maintenance Materials	Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.	1.8.A													
1,245			27 15 00		Maintenance Materials	Patch-Panel Units: One of each type	1.8.A.1													
1,246			27 15 00		Maintenance Materials	Connecting Blocks: One of each type	1.8.A.2													
1,247			27 15 00		Maintenance Materials	Device Plates: One of each type	1.8.A.3													
1,248			27 51 16		Product Data	For each type of product indicated	1.5.A													
1,249			27 51 16		Shop Drawings	For supports and seismic restraints for control consoles, equipment cabinets and racks, and components. Include plans, elevations, sections, details, and attachments to other work.	1.5.B													
1,250			27 51 16		Shop Drawings	Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location and size of each field connection	1.5.B.1													
1,251			27 51 16		Shop Drawings	Calculations: For sizing backup battery	1.5.B.2													
1,252			27 51 16		Shop Drawings	Wiring Diagrams: For power, signal, and control wiring	1.5.B.3													
1,253			27 51 16		Shop Drawings	Identify terminals to facilitate installation, operation, and maintenance	1.5.B.3.a													
1,254			27 51 16		Shop Drawings	Single-line diagram showing interconnection of components	1.5.B.3.b													
1,255			27 51 16		Shop Drawings	Cabling diagram showing cable routing	1.5.B.3.c													

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1,256			27 51 16		Shop Drawings	For supports and seismic restraints for control consoles, equipment cabinets and racks, and components 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.C													
1,257			27 51 16		Delegated-Design Submittal	Detail fabrication and assembly of supports and seismic restraints for control consoles, equipment cabinets and racks, and components	1.5.C.1													
1,258			27 51 16		Coordination Drawings	Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings are shown and coordinated with each other, using input from installers of the items involved	1.6.A													
1,259			27 51 16		Qualification Data	For qualified Installer	1.6.B													
1,260			27 51 16		Seismic Qualification Certificates	For control consoles, equipment cabinets and racks, accessories, and components, from manufacturer.	1.6.C													
1,261			27 51 16		Seismic Qualification Certificates	Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation	1.6.C.1													
1,262			27 51 16		Seismic Qualification Certificates	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements	1.6.C.2													
1,263			27 51 16		Field quality-control reports	Field quality-control reports	1.6.D													
1,264			27 51 16		Operation and Maintenance Data	For public address and mass notification systems to include in emergency, operation, and maintenance manuals	1.7.A													
1,265			27 51 16		Maintenance Materials	Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents	1.8.A													
1,266			27 51 16		Maintenance Materials	Speaker: One – ceiling mounted speaker assembly (including brackets, boxes and supports), one – wall mounted speaker assembly	1.8.A.1													
1,267			27 51 23		Product Data	For each type of product indicated	1.3.A													
1,268			27 51 23		Shop Drawings	For intercommunications and program systems. Include plans, elevations, sections, details, and attachments to other work	1.3.B													

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1,269			27 51 23		Shop Drawings	Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location and size of each field connection	1.3.B.1													
1,270			27 51 23		Shop Drawings	Include scaled drawings for master station that detail built-in equipment	1.3.B.2													
1,271			27 51 23		Shop Drawings	Wiring Diagrams: For power, signal, and control wiring	1.3.B.3													
1,272			27 51 23		Shop Drawings	Identify terminals to facilitate installation, operation, and maintenance	1.3.B.3.a													
1,273			27 51 23		Shop Drawings	Single-line diagram showing interconnection of components	1.3.B.3.b													
1,274			27 51 23		Shop Drawings	Cabling diagram showing cable routing	1.3.B.3.c													
1,275			27 51 23		Qualification Data	For qualified Installer and testing agency	1.4.A													
1,276			27 51 23		Field quality-control reports	Field quality-control reports	1.4.B													
1,277			27 51 23		Operation and Maintenance Data	For intercommunications and program systems to include in operation and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following	1.5.A													
1,278			27 51 23		Operation and Maintenance Data	A record of Owner's equipment-programming option decision	1.5.A.1													
1,279			28 05 13		Product Data	For each type of product	1.4.A													
1,280			28 05 13		Product Data	For coaxial cable, include the following installation data for each type used	1.4.A.1													
1,281			28 05 13		Product Data	Nominal OD	1.4.A.1.a													
1,282			28 05 13		Product Data	Minimum bending radius	1.4.a.1.b													
1,283			28 05 13		Product Data	Maximum pulling tension	1.4.a.1.c													
1,284			28 05 13		Qualification Data	For qualified layout technician, installation supervisor, and field inspector	1.5.A													
1,285			28 05 13		Source quality-control reports	Source quality-control reports	1.5.B													
1,286			28 05 13		Field quality-control reports	Field quality-control reports	1.5.C													
1,287			28 05 13		Testing Agency Qualifications	An NRTL	1.6.A													
1,288			28 05 13		Testing Agency Qualifications	Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testin	1.6.A.1													
1,289			28 13 00		Product Data	For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Reference each product to a location on Drawings. Test and evaluation data presented in Product Data shall comply with SIA BIO-01	1.3.A													
1,290			28 13 00		Shop Drawings	Include plans, elevations, sections, details, and attachments to other work	1.3.B													

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1,291			28 13 00		Shop Drawings	Diagrams for cable management system	1.3.B.1													
1,292			28 13 00		Shop Drawings	System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3	1.3.B.2													
1,293			28 13 00		Shop Drawings	Wiring Diagrams. For power, signal, and control wiring. Cable Administration Drawings: As specified in "Identification" Article	1.3.B.3													
1,294			28 13 00		Shop Drawings	Battery and charger calculations for central station, workstations, and controllers	1.3.B.4													
1,295			28 13 00		Other Action Submittals	Other Action Submittals	1.3.C													
1,296			28 13 00		Other Action Submittals	Project planning documents as specified in Part 3	1.3.C.1													
1,297			28 13 00		Field quality-control reports	Field quality-control reports	1.4.A													
1,298			28 13 00		Operation and Maintenance Data	For security system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following	1.5.A													
1,299			28 13 00		Operation and Maintenance Data	Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy submittal	1.5.A.1													
1,300			28 13 00		Operation and Maintenance Data	System installation and setup guides with data forms to plan and record options and setup decisions	1.5.A.2													
1,301			28 23 00		Product Data	For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes	1.4.A													
1,302			28 23 00		Shop Drawings	For video surveillance. Include plans, elevations, sections, details, and attachments to other work	1.4.B													
1,303			28 23 00		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	1.4.B.1													
1,304			28 23 00		Shop Drawings	Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes	1.4.B.2													
1,305			28 23 00		Shop Drawings	Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements	1.4.B.3													

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1,306			28 23 00		Shop Drawings	UPS: Sizing calculations	1.4.B.4													
1,307			28 23 00		Shop Drawings	Wiring Diagrams: For power, signal, and control wiring	1.4.B.5													
1,308			28 23 00		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	1.4.B													
1,309			28 23 00		Seismic Qualification Certificates	For video surveillance, cameras, camera-supporting equipment, accessories, and components, from manufacturer	1.5.A													
1,310			28 23 00		Seismic Qualification Certificates	Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation	1.5.A.1													
1,311			28 23 00		Seismic Qualification Certificates	Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions	1.5.A.2													
1,312			28 23 00		Seismic Qualification Certificates	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements	1.5.A.3													
1,313			28 23 00		Field quality-control reports	Field quality-control reports	1.5.B													
1,314			28 23 00		Warranty: Sample of special warranty	Warranty: Sample of special warranty	1.5.C													
1,315			28 23 00		Operation and Maintenance Data	For cameras, power supplies, infrared illuminators, monitors, videotape recorders, digital video recorders, video switches, and control-station components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following	1.6.A													
1,316			28 23 00		Operation and Maintenance Data	Lists of spare parts and replacement components recommended to be stored at the site for ready access	1.6.A.1													
1,317			28 31 11		Product Data:	For each type of product indicated	1.6.A													
1,318			28 31 11		Shop Drawings:	For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work	1.6.B													
1,319			28 31 11		Shop Drawings:	Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72	1.6.B.1													

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1,320			28 31 11		Shop Drawings:	Include voltage drop calculations for notification appliance circuits	1.6.B.2													
1,321			28 31 11		Shop Drawings:	Include battery-size calculations	1.6.B.3													
1,322			28 31 11		Shop Drawings:	Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating	1.6.B.4													
1,323			28 31 11		Shop Drawings:	Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations	1.6.B.5													
1,324			28 31 11		Shop Drawings:	Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram	1.6.B.6													
1,325			28 31 11		Shop Drawings:	Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits	1.6.B.7													
1,326			28 31 11		General Submittal Requirements		1.6.C													
1,327			28 31 11		General Submittal Requirements	Submittals shall be approved by authorities having jurisdiction prior to submitting them to CTDOT PM	1.6.C.1													
1,328			28 31 11		General Submittal Requirements	Shop Drawings shall be prepared by persons with the following qualifications	1.6.C.2													
1,329			28 31 11		General Submittal Requirements	Trained and certified by manufacturer in fire-alarm system design	1.6.C.2.a													
1,330			28 31 11		General Submittal Requirements	NICET-certified fire-alarm technician, Level III minimum	1.6.C.2.b													
1,331			28 31 11		General Submittal Requirements	Licensed or certified by authorities having jurisdiction	1.6.C.2.c													
1,332			28 31 11		Qualification Data:	For qualified Installer	1.7.A													
1,333			28 31 11		Seismic Qualification Certificates	For fire-alarm control unit, accessories, and components, from manufacturer	1.7.B													
1,334			28 31 11		Seismic Qualification Certificates	Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation	1.7.B.1													

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1,335			28 31 11		Seismic Qualification Certificates	Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions	1.7.B.2													
1,336			28 31 11		Seismic Qualification Certificates	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements	1.7.B.3													
1,337			28 31 11		Field quality-control reports	Field quality-control reports	1.7.C													
1,338			28 31 11		Operation and Maintenance Data	For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," deliver copies to authorities having jurisdiction and include the following	1.8.A													
1,339			28 31 11		Operation and Maintenance Data	Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72	1.8.A.1													
1,340			28 31 11		Operation and Maintenance Data	Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter	1.8.A.2													
1,341			28 31 11		Operation and Maintenance Data	Record copy of site-specific software	1.8.A.3													
1,342			28 31 11		Operation and Maintenance Data	Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following	1.8.A.4													
1,343			28 31 11		Operation and Maintenance Data	Frequency of testing of installed components	1.8.1.4.a													
1,344			28 31 11		Operation and Maintenance Data	Frequency of inspection of installed components	1.8.A.1.b													
1,345			28 31 11		Operation and Maintenance Data	Requirements and recommendations related to results of maintenance	1.8.A.1.c													
1,346			28 31 11		Operation and Maintenance Data	Manufacturer's user training manuals.	1.8.A.1.d													
1,347			28 31 11		Operation and Maintenance Data	Manufacturer's required maintenance related to system warranty requirements	1.8.A.5													
1,348			28 31 11		Operation and Maintenance Data	Abbreviated operating instructions for mounting at fire-alarm control unit	1.8.A.6													
1,349			28 31 11		Software and Firmware Operational Documentation	Software and Firmware Operational Documentation	1.8.B													
1,350			28 31 11		Software and Firmware Operational Documentation	Software operating and upgrade manuals	1.8.B.1													
1,351			28 31 11		Software and Firmware Operational Documentation	Program Software Backup: On magnetic media or compact disk, complete with data files	1.8.B.2													
1,352			28 31 11		Software and Firmware Operational Documentation	Device address list	1.8.B.3													
1,353			28 31 11		Software and Firmware Operational Documentation	Printout of software application and graphic screens	1.8.B.4													

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1,354			31 23 19		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,355			31 23 23		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
1,356			31 23 23		Fill Composition Test Reports	Results of laboratory tests on proposed and actual materials used	1.4.B													
1,357			31 23 23		Compaction Density Test Reports	Compaction Density Test Reports	1.4.C													
1,358			31 23 23 .14		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,359			31 23 23.23		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,360			31 35 19.17		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,361			31 41 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
1,362			31 41 00		Drawings and Calculations	The working drawings and design calculations shall be prepared, sealed, and signed by a Professional Engineer, licensed in the State of Connecticut. The furnishing of such plans shall not serve to relieve the Trade Contractor of any part of his responsibility for the safety of the work or for the successful completion of the project	1.3.B													
1,363			31 41 00		Plans	The Trade Contractor shall submit to the Engineer for approval, plans showing the proposed method of construction prior to the start of such construction. If no limits are shown on the plans for the sheet piling that may be ordered left in place, then the plans for the entire temporary installation shall be submitted for approval. If no portion of the temporary earth retaining system is ordered left in place, all parts of the temporary earth retaining system shall be removed upon completion of the work for which it was provided	1.3.C													
1,364			32 11 23		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
1,365			32 16 13.13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,366			32 16 13.43		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,367			32 16 23.13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,368			32 16 23.16		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													

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1,369			32 16 23.16		Shop Drawings	Prior to fabricating any materials, the Trade Contractor shall submit shop drawing of the reinforcing steel and splicing materials, with material lists, materials designations, placement diagrams, bending diagrams, and manufacturer's literature for mechanical connections, for review and approval, in accordance with Section 01 33 00 Submittal Procedures. The Trade Contractor is responsible for incidental revisions of materials furnished in accordance with shop drawing and order lists to make them comply with the requirements of the plans and specifications	1.3.B														
1,370			32 17 23.13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
1,371			32 17 26.01		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,372			32 17 26.01		See Section 31 23 16	Excavation, for disposal of unsuitable material.	1.2.B													
1,373			32 31 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,374			32 33 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,375			32 91 19.13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,376			33 22 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4													
1,377			33 22 00		Technical information on equipment	Within 30 days after the Award of Trade Contract, and before materials and/or equipment are delivered to the site, submit to the CTDOT PM technical information on equipment to be furnished and certification of compliance with applicable standard tests for materials to be used, if materials and/or appurtenances are other than brand names specified	1.4.A													
1,378			33 22 00		Substitution	Where the phrases "or equal" or "of equal quality" appear, substitution may be made only by approval of the CTDOT PM. Such substitution will be considered only when submitted with full and complete technical data and information for evaluation prior to installation. (See Section 01 25 00 Substitution Procedures)	1.4.B													
1,379			33 22 00		Testing Samples	An independent testing company, approved by the CTDOT PM, shall obtain samples and provide sieve analysis for the granular materials to be used	1.4.C													

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1,380			33 22 00		Compaction Tests	An independent testing company, approved by the CTDOT PM, shall provide compaction tests as required	1.4.D													
1,381			33 22 00		Concrete Design Mix	The manufacturer or supplier, shall provide current concrete design mix with a 7 day and two 28 day compressive strength tests for any concrete requiring reinforcing steel	1.4.E													
1,382			33 22 00		Affected Utility	Provide minimum of 48-hour notice to CTDOT PM, and a written authorization notice to proceed from the affected utility, before interrupting any utility	1.4.F													
1,383			33 22 00		Tests on the Installed Utilities and Appurtenances	Submit written results of all tests on the installed utilities and appurtenances to the CTDOT PM	1.4.G													
1,384			33 22 00		Installation	Verify that all materials and equipment will be available in time for orderly installation during the course of the work	1.4.H													
1,385			33 41 10		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4													
1,386			33 41 10		Technical Information	Within 30 days after the Award of Trade Contract, and before materials and/or equipment are delivered to the site, submit to the CTDOT PM technical information on equipment to be furnished and certification of compliance with applicable standard tests for materials to be used, if materials and/or appurtenances are other than brand names specified	1.4.A													
1,387			33 41 10		Substitution	Where the phrases "or equal" or "of equal quality" appear, substitution may be made only by approval of the CTDOT PM. Such substitution will be considered only when submitted with full and complete technical data and information for evaluation prior to installation. (See Section 01 25 00 Substitution Procedures)	1.4.B													
1,388			33 41 10		Samples	An independent testing company, approved by the CTDOT PM, shall obtain samples and provide sieve analysis for the granular materials to be used	1.4.C													
1,389			33 41 10		Compaction Tests	An independent testing company, approved by the CTDOT PM, shall provide compaction tests as required	1.4.D													

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1,390			33 41 10		Concrete Design Mix	An independent testing company, approved by the CTDOT PM, shall provide current concrete design mix with a 7 day and two 28 day compressive strength tests for any concrete requiring reinforcing steel	1.4.E													
1,391			33 41 10		Affected Utility	Provide minimum of 48-hour notice to CTDOT PM, and a written authorization notice to proceed from the affected utility, before interrupting any utility	1.4.F													
1,392			33 41 10		Tests on the Installed Utilities and Appurtenances	Submit written results of all tests on the installed utilities and appurtenances to the CTDOT PM	1.4.G													
1,393			33 41 10		Operations & Maintenance Manuals	Furnish four (4) complete sets of Operations & Maintenance Manuals which are job specific at time of start up	1.4.H													
1,394			33 41 10		Operations & Maintenance Manuals	The manuals shall be prepared with clear instructions which will enable personnel to operate and maintain the complete pump station system	1.4.H.1													
1,395			33 41 10		Operations & Maintenance Manuals	The manuals shall be bound in a three ring vinyl binder with a heavy gauge clear vinyl overlay on the front cover and spine, which is insertable from the top. A title sheet tabulating information including: name and location of project, manufacturers and consulting Designer's name and address, shall be placed in these pockets. The manuals shall contain an index which lists and locates all enclosed literature and drawings	1.4.H.2													
1,396			33 41 10		Operations & Maintenance Manuals	The manuals shall be comprehensive and contain as a minimum the following	1.4.H.3													
1,397			33 41 10		Operations & Maintenance Manuals	Instructions relevant to all modes of equipment operation	1.4.H.3.a													
1,398			33 41 10		Operations & Maintenance Manuals	Service and troubleshooting instructions as may be available from select manufacturers of equipment supplied	1.4.H.3.b													
1,399			33 41 10		Operations & Maintenance Manuals	Procedures for the adjustment of equipment at initial start-up, during routine preventative maintenance, and following replacement or repair	1.4.H.3.c													
1,400			33 41 10		Operations & Maintenance Manuals	Instructions for testing and calibration of electronic components required to determine proper performance	1.4.H.3.d													

TITLE:	New Haven Rail Yard Facilities Improvements
JOB NAME:	Maintenance of Way Building
LOCATION:	New Haven, CT
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CONTRACTOR:	

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1,401			33 41 10		Operations & Maintenance Manuals	As-Built mechanical drawings and dimensional information showing the actual layout and location of all major equipment components within the structures	1.4.H.3.e													
1,402			33 41 10		Pre-fabricatedPpumping Station	Furnish six (6) sets of submittals for the pre-fabricated pumping station to the Designer for approval, prior to the production of the pump station. Submittals shall contain complete, detailed shop drawings and literature on all equipment, including descriptions, diagrams, parts and listing of construction materials as required indicating full compliance with the specifications. Partial submittals of shop drawings or equipment data will not be accepted, reviewed or approved	1.4.I														
1,403			33 41 10		Pre-fabricatedPpumping Station	Shop drawings and equipment data shall be complete with respect to dimensions, materials of construction, design/performance criteria, wiring diagrams, component parts, etc., to enable the Designer to conduct a complete review of all equipment specified. Submittals shall be comprehensive and shall fully address and contain	1.4.I.1													
1,404			33 41 10		Pre-fabricatedPpumping Station	Structural design calculations, flotation calculations as specified	1.4.I.2													
1,405			33 41 10		Pre-fabricatedPpumping Station	Full detailed shop drawings, including all elevations and plan views depicting size and locations of all major pieces of equipment	1.4.I.3													
1,406			33 41 10		Pre-fabricatedPpumping Station	Schematic electrical wiring diagrams, piping layouts, and descriptive literature on each item of equipment to be furnished as specified	1.4.I.4													
1,407			33 41 10		Pre-fabricatedPpumping Station	Certified performance and test data as specified in the specification	1.4.I.5													
1,408			33 41 10		Pre-fabricatedPpumping Station	Pump catalog Data complete with pump dimensional drawings, electrical data and performance curves	1.4.I.6													
1,409			33 41 10		Pre-fabricatedPpumping Station	Pump Breakaway guide fitting data complete with dimensional drawings, material of construction and fictional loss information	1.4.I.7													
1,410			33 41 10		Pre-fabricatedPpumping Station	Job specific installation drawings	1.4.I.8													

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1,411			33 41 10		Pre-fabricatedPpumping Station	Control panel data complete with panel layout drawing, deadfront door layouts control wiring schematics, power wiring schematics and any other requirements for equipment specified within	1.4.I.9													
1,412					Pre-fabricatedPpumping Station	Complete information on all related pump station accessories	1.4.I.10													
1,413					Pre-fabricatedPpumping Station	Each submittal shall be complete with a cover page and index, outlining the description of all items being supplied. The complete submittal shall be bound in a three ring vinyl binder	1.4.I.11													
1,414			33 41 10		Deviations or Omissions	At the time of submission, the Trade Contractor shall, in writing, call the Designer's attention to any deviations from the requirements of these specifications that are contained in the submittal documents. Deviations or omissions in the submittal drawings and related data shall not relieve the Trade Contractor from his responsibility for providing the specified requirements unless the Designer has given written approval for the deviations or omissions identified	1.4.J													
1,415			33 41 10		Installation	Installation	1.4.K													
1,416			33 41 13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2.A													
1,417			33 41 20		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4													
1,418			33 41 20		Certifications of Compliance	Within 30 days after the Award of Trade Contract, and before materials and/or equipment are delivered to the site, submit to the CTDOT PM certifications of compliance with applicable standard technical information on equipment to be furnished and tests for materials to be used, if materials and/or appurtenances are other than brand names specified	1.4.A													
1,419			33 41 20		Substitution	Where the phrases "or equal" or "of equal quality" appear, substitution may be made only by approval of the CTDOT PM. Such substitution will be considered only when submitted with full and complete technical data and information for evaluation prior to installation. (See Section 01 25 00 Substitution Procedures)	1.4.B													

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1,420			33 41 20		Samples	An independent testing company, approved by the CTDOT PM, shall obtain samples and provide sieve analysis for the granular materials to be used	1.4.C													
1,421			33 41 20		Compaction Tests	An independent testing company, approved by the CTDOT PM, shall provide compaction tests as required	1.4.D													
1,422			33 41 20		Concrete Design Mix	An independent testing company, approved by the CTDOT PM, shall provide current concrete design mix with a 7 day and 2 - 28 day compressive strength tests for any concrete requiring reinforcing steel	1.4.E													
1,423			33 41 20		Affected Utility	Provide minimum of 48-hour notice to CTDOT PM, and a written authorization notice to proceed from the affected utility, before interrupting any utility	1.4.F													
1,424			33 41 20		Utilities and Appurtenances	Submit written results of all tests on the installed utilities and appurtenances to the CTDOT PM	1.4.G													
1,425			33 41 20		Materials and Equipment	Verify that all materials and equipment will be available in time for orderly installation during the course of the work	1.4.H													
1,426			33 44 19.21		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.4.A													
1,427			33 44 19.21		Working Drawings	Working drawings in accordance with Division 1 shall be required for the system selected by the Trade Contractor. The working drawings shall include the HGL analysis and all other computations in strict accordance with the “Hydraulic Design” section of this special provision, including a completed Form B – Contractor Proposal	1.4.B													
1,428			33 44 19.21		Revisions	If revisions to the layout of the system are required to accommodate the selected separator, the working drawings shall also include plans that show the required revisions. These plans shall show the revised position of the hydrodynamic separator unit(s), and all revisions to connecting structures, pipes, elevations, and details, including the design within the flow diversion structure	1.4.C													

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1,429			33 44 19.21		Working Drawings	Working drawings shall also show details for construction, reinforcing joints, internal and external components, any cast-in-place appurtenances, locations and elevations of pipe openings, access manhole locations and elevations, and type / method of sealing pipe entrances	1.4.D													
1,430			33 44 19.21		Working Drawings for each Hydrodynamic Separator	Working drawings for each hydrodynamic separator on the project shall have all appropriate vertical dimensions referenced with elevations that are consistent with the project plans. In addition to any other structural, material or installation requirements, the working drawings shall clearly indicate the following information	1.4.E													
1,431			33 44 19.21		Working Drawings for each Hydrodynamic Separator	The elevation and flow rate when internal flow bypass would occur within the device	1.4.E.1													
1,432			33 44 19.21		Working Drawings for each Hydrodynamic Separator	The location, dimensions and volume (capacity) of the sediment storage area within the device	1.4.E.2													
1,433			33 44 19.21		Working Drawings	The working drawings shall be sealed by a professional engineer licensed in the state where the devices are manufactured and that said engineer shall certify the device meets the minimum requirements of the ConnDOT Standards	1.4.F													
1,434			33 44 19.21		Working Drawings	The working drawing submission by the Trade Contractor shall consist of the following documents	1.4.G													
1,435			33 44 19.21		Working Drawings	Working drawings for each hydrodynamic separator proposed for installation on the project	1.4.G.1													
1,436			33 44 19.21		Working Drawings	Hydraulic design calculations including the head loss documentation and completed Hydrodynamic Separator Design Data Sheets (Form B – Contractor Proposal) with professional engineer signature for each hydrodynamic separator	1.4.G.2													
1,437			33 44 19.21		Working Drawings	Copies of the pertinent construction plan, profile, cross section and detail sheets that have been annotated with any proposed drainage revisions that are required for the installation of the proposed hydrodynamic separator(s). If no changes are required, the submittal shall note same	1.4.G.3													

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1,438			33 44 19.21		Working Drawings	An Operations and Maintenance Manual for each hydrodynamic separator describing operations, inspection, maintenance procedures and any applicable warranty information	1.4.G.4													
1,439			33 44 19.21		Working Drawings	Acceptance of the working drawing submission by the Engineer must be obtained by the Trade Contractor prior to the fabrication of each hydrodynamic separator and diversion structure	1.4.H													
1,440			33 49 00		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.2													
1,441			33 49 27		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
1,442			33 49 27		Product Literature	Submit product literature that includes information on the performance and operation of the valve, materials of construction, dimensions and weights, elastomer characteristics, flow data, headloss data, and pressure ratings	1.3.B													
1,443			33 49 27		Shop Drawings	Provide shop drawings that clearly identify the valve dimensions	1.3.C													
1,444			33 49 27		Shop Drawings	Provide shop drawings that indicate all details of the related installation hardware	1.3.D													
1,445			33 49 27		Manufacturer's Installation Instructions	Submit manufacturer's installation instructions	1.3.E													
1,446			33 49 27		Operations and Maintenance Manuals	Submit manufacturer's recommended operations and maintenance manuals and instructions	1.3.F													
1,447			33 71 49.13		Product Data	For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes	1.4.A													
1,448			34 11 26.13		See Section 01 33 00 and 01 33 00.13	Submittal Procedures and Document Control	1.3.A													
1,449			34 11 26.13		Samples:	Submit as one representative sample and one sample of each new source of supply as requested by Engineer. Samples of not less then 150 lbs should be submitted. Field samples shall be secured in accordance with ASTM D75	1.3.B													
1,450			34 11 26.13		Test reports	Test reports for testing specified herein	1.3.C													

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1,451			41 22 00		Refer to Section 11 06 00	Refer to Section 11 06 00 Equipment Schedule for submittal requirements listed in the "Submittals" column of the equipment list. In the event of conflict between Section 11 06 00 Equipment Schedule and the following expanded submittal descriptions, Section 11 06 00 Equipment Schedule is to govern	1.5.A													
1,452			41 22 00		Product Data	Product Data	1.5.B													
1,453			41 22 00		Product Data	Submit Product Data in accordance with Division 1 - General Requirements of these specifications	1.5.B.1													
1,454			41 22 00		Product Data	All Product Data submittals shall identify proposed project specific items marked by arrow, circle, underline, reproducible highlight, or other markings clearly discernable by the reviewer, to show which specific items, parts and accessories are being submitted for the project product data review. Non-marked or generic product data submittals with no marks indicating specific items, parts and accessories will be a cause for rejection	1.5.B.2													
1,455			41 22 00		Product Data	Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page	1.5.B.3													
1,456			41 22 00		Operation and Maintenance Manual	Operation and Maintenance Manual	1,5,C													
1,457			41 22 00		Operation and Maintenance Manual	Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to	1.5.C.1													
1,458			41 22 00		Operation and Maintenance Manual	Description of system and components	1.5.C.1.a													
1,459			41 22 00		Operation and Maintenance Manual	Schematic diagrams of electrical and compressed air systems	1.5.C.1.b													
1,460			41 22 00		Operation and Maintenance Manual	Manufacturer's printed operating and maintenance instructions	1.5.C.1.c													
1,461			41 22 00		Operation and Maintenance Manual	List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source	1.5.C.1.d													

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1,462			41 22 00		Manual	Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1 - General Requirements	1.5.C.2													
1,463			41 22 00		Shop Drawings	Submit in accordance with Division 1 - General Requirements of these specifications. Refer to Section 11 06 00 Equipment Schedule for the equipment mark numbers requiring shop drawings	1.5.D													
1,464			41 22 00		Shop Drawings	Submitted shop drawings shall be project specific and shall include a minimum 1/8 inch to 1 foot scaled (or larger standard architectural imperial scale), dimensioned, graphical representation of the size, orientation, and location for the submitted equipment. The drawings shall further include dimensions from structural elements or architectural grid lines, operational clearances, locations of any utility service connection points, mounting requirements, and structural supports required for the submitted equipment	1.5.D.1													
1,465																				
1,466			42 63 00		Refer to Section 11 06 00	Refer to Section 11 06 00 Equipment Schedule for submittal requirements listed in the "Submittals" column of the equipment list. In the event of conflict between Section 11 06 00 Equipment Schedule and the following expanded submittal descriptions, Section 11 06 00 Equipment Schedule is to govern	1.5.A													
1,467			42 63 00		Product Data	Product Data	1.5.B													
1,468			42 63 00		Product Data	Submit Product Data in accordance with Division 1 - General Requirements of these specifications	1.5.B.1													
1,469			42 63 00		Product Data	All Product Data submittals shall identify proposed project specific items marked by arrow, circle, underline, reproducible highlight, or other markings clearly discernable by the reviewer, to show which specific items, parts and accessories are being submitted for the project product data review. Non-marked or generic product data submittals with no marks indicating specific items, parts and accessories will be a cause for rejection	1.5.B.2													

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1,470			42 63 00		Product Data	Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page	1.5.B.2													
1,471			42 63 00		Operation and Maintenance Manual	Operation and Maintenance Manual	1.5.C													
1,472			42 63 00		Operation and Maintenance Manual	Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to	1.5.C.1													
1,473			42 63 00		Operation and Maintenance Manual	Description of system and components	1.5.C.1.a													
1,474			42 63 00		Operation and Maintenance Manual	Schematic diagrams of electrical, plumbing and compressed air systems	1.5.C.1.b													
1,475			42 63 00		Operation and Maintenance Manual	Manufacturer's printed operating instructions	1.5.C.1.c													
1,476			42 63 00		Operation and Maintenance Manual	Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties	1.5.C.1.d													
1,477			42 63 00		Operation and Maintenance Manual	List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source	1.5.C.1.e													
1,478			42 63 00		Operation and Maintenance Manual	Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1 - General Requirements	1.5.C.2													
1,479			42 63 00		Operation and Maintenance Manual	Submit Shop Drawings in accordance with Division 1 -General Requirements of these specifications. Refer to Section 11 06 00 Equipment Schedule for the equipment mark numbers requiring shop drawings	1.5.D													

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1,480			42 63 00		Operation and Maintenance Manual	Submitted shop drawings shall be project specific and shall include a minimum 1/8 inch to 1 foot scaled (or larger standard architectural imperial scale), dimensioned, graphical representation of the size, orientation, and location for the submitted equipment. The drawings shall further include dimensions from structural elements or architectural grid lines, operational clearances, locations of any utility service connection points, mounting requirements, and structural supports required for the submitted equipment	1.5.D.1														
1,481			42 63 00		Warranty	Submit warranties in accordance with Division 1 - General Requirements of these specifications	1.7.D													
1,482			44 11 16		Refer to Section 11 06 00	Refer to Section 11 06 00 Equipment Schedule for submittal requirements listed in the "Submittals" column of the equipment list. In the event of conflict between Section 11 06 00 Equipment Schedule and the following expanded submittal descriptions, Section 11 06 00 Equipment Schedule is to govern	1.4.A													
1,483			44 11 16		Product Data	Product Data	1.4.B													
1,484			44 11 16		Product Data	Submit Product Data in accordance with Division 1 - General Requirements of these specifications	1.4.B.1													
1,485			44 11 16		Product Data	All Product Data submittals shall identify proposed project specific items marked by arrow, circle, underline, reproducible highlight, or other markings clearly discernable by the reviewer, to show which specific items, parts and accessories are being submitted for the project product data review. Non-marked or generic product data submittals with no marks indicating specific items, parts and accessories will be a cause for rejection	1.4.B.2													
1,486			44 11 16		Product Data	Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page	1.4.B.3													
1,487			44 11 16		Operation and Maintenance Manual	Operation and Maintenance Manual	1.4.C													

TITLE:	New Haven Rail Yard Facilities Improvements
JOB NAME:	Maintenance of Way Building
LOCATION:	New Haven, CT
CONTRACT NO:	State Project NO. 0301-0124
CONTRACTOR:	

SUBMITTAL REGISTER

									CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
	(a)	(b)	(c)	(d)			(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Line	Activity #	Trans-mittal #	Specification Section	SD #	Submittal Description	Item Submitted	Paragraph #	Classification: GOVT or A/E Revwr	Submit	Approval Needed By	Material Needed By	Action Code	Date Of Action	Date FWD to APPR / Auth Date RCD From CONTR	Date FWD To Other Revwr	Date RCD From Other Revwr	Action Code	Date Of Action	Mailed To CONTR/ Date RCD From APPR Authority	Remarks
1,488			44 11 16		Operation and Maintenance Manual	Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to	1.4.C.1													
1,489			44 11 16		Operation and Maintenance Manual	Description of system and components	1.4.C.1.a													
1,490			44 11 16		Operation and Maintenance Manual	Schematic diagrams of electrical, plumbing and compressed air systems	1.4.C.1.b													
1,491			44 11 16		Operation and Maintenance Manual	Manufacturer's printed operating instructions	1.4.C.1c													
1,492			44 11 16		Operation and Maintenance Manual	Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties	1.4.C.1.d													
1,493			44 11 16		Operation and Maintenance Manual	List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source	1.4.C.1.e													
1,494			44 11 16		Operation and Maintenance Manual	Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1 - General Requirements	1.4.C.2													
1,495			44 11 16		Shop Drawings	Submit in accordance with Division 1 - General Requirements of these specifications. Refer to Section 11 06 00 Equipment Schedule for the equipment mark numbers requiring shop drawings	1.4.D													
1,496			44 11 16		Shop Drawings	Submitted shop drawings shall be project specific and shall include a minimum 1/8 inch to 1 foot scaled (or larger standard architectural imperial scale), dimensioned, graphical representation of the size, orientation, and location for the submitted equipment. The drawings shall further include dimensions from structural elements or architectural grid lines, operational clearances, locations of any utility service connection points, mounting requirements, and structural supports required for the submitted equipment	1.4.D.1													

TITLE:	New Haven Rail Yard Facilities Improvements
JOB NAME:	Maintenance of Way Building
LOCATION:	New Haven, CT
CONTRACT NO:	State Project NO. 0301-0124
CONTRACTOR:	

SUBMITTAL REGISTER

									CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
	(a)	(b)	(c)	(d)			(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Line	Activity #	Trans-mittal #	Specification Section	SD #	Submittal Description	Item Submitted	Paragraph #	Classification: GOVT or A/E Revwr	Submit	Approval Needed By	Material Needed By	Action Code	Date Of Action	Date FWD to APPR / Auth Date RCD From CONTR	Date FWD To Other Revwr	Date RCD From Other Revwr	Action Code	Date Of Action	Mailed To CONTR/ Date RCD From APPR Authority	Remarks
1,497			44 11 16		Warranty	Submit warranties in accordance with Division 1 - General Requirements of these specifications	1.6.D													
1,498			44 11 37		Refer to Section 11 06 00	Refer to Section 11 06 00 Equipment Schedule for submittal requirements listed in the "Submittals" column of the equipment list. In the event of conflict between Section 11 06 00 Equipment Schedule and the following expanded submittal descriptions, Section 11 06 00 Equipment Equipment Schedule is to govern	1.5.A													
1,499			44 11 37		Product Data	Product Data	1.5.B													
1,500			44 11 37		Product Data	Submit Product Data in accordance with Division 1 - General Requirements of these specifications	1.5.B.1													
1,501			44 11 37		Product Data	All Product Data submittals shall identify proposed project specific items marked by arrow, circle, underline, reproducible highlight, or other markings clearly discernable by the reviewer, to show which specific items, parts and accessories are being submitted for the project product data review. Non-marked or generic product data submittals with no marks indicating specific items, parts and accessories will be a cause for rejection	1.5.B.2													
1,502			44 11 37		Product Data	Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page	1.5.B.3													
1,503			44 11 37		Operation and Maintenance Manual	Operation and Maintenance Manual	1.5.C													
1,504			44 11 37		Operation and Maintenance Manual	Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to	1.5.C.1													
1,505			44 11 37		Operation and Maintenance Manual	Description of system and components	1.5.C.1.a													
1,506			44 11 37		Operation and Maintenance Manual	Schematic diagrams of electrical, plumbing and compressed air systems	1.5.C.1.b													
1,507			44 11 37		Operation and Maintenance Manual	Manufacturer's printed operating instructions	1.5.C.1.c													

TITLE:	New Haven Rail Yard Facilities Improvements
JOB NAME:	Maintenance of Way Building
LOCATION:	New Haven, CT
CONTRACT NO:	State Project NO. 0301-0124
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SUBMITTAL REGISTER

									CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
	(a)	(b)	(c)	(d)			(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Line	Activity #	Trans-mittal #	Specification Section	SD #	Submittal Description	Item Submitted	Paragraph #	Classification: GOVT or A/E Revwr	Submit	Approval Needed By	Material Needed By	Action Code	Date Of Action	Date FWD to APPR / Auth Date RCD From CONTR	Date FWD To Other Revwr	Date RCD From Other Revwr	Action Code	Date Of Action	Mailed To CONTR/ Date RCD From APPR Authority	Remarks
1,508			44 11 37		Operation and Maintenance Manual	Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties	1.5.C.1.d													
1,509			44 11 37		Operation and Maintenance Manual	List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source	1.5.C.1.e													
1,510			44 11 37		Operation and Maintenance Manual	Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1 - General Requirements	1.5.C.2													
1,511			44 11 37		Shop Drawings	Submit Shop Drawings in accordance with Division 1 -General Requirements of these specifications. Refer to Section 11 06 00 Equipment Schedule for the equipment mark numbers requiring shop drawings	1.5.D													
1,512			44 11 37		Shop Drawings	Submitted shop drawings shall be project specific and shall include a minimum 1/8 inch to 1 foot scaled (or larger standard architectural imperial scale), dimensioned, graphical representation of the size, orientation, and location for the submitted equipment. The drawings shall further include dimensions from structural elements or architectural grid lines, operational clearances, locations of any utility service connection points, mounting requirements, and structural supports required for the submitted equipment	1.5.D.1													
1,513			44 11 37		Shop Drawings	Submitted shop drawings shall indicate, where applicable, coordination with other project specific conditions and/or specified equipment which directly affects performance of the submitted equipment, such as ductwork, fans, vents, electrical utilities, etc	1.5.D.2													

TITLE:	New Haven Rail Yard Facilities Improvements
JOB NAME:	Maintenance of Way Building
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CONTRACT NO:	State Project NO. 0301-0124
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SUBMITTAL REGISTER

									CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
	(a)	(b)	(c)	(d)			(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Line	Activity #	Trans-mittal #	Specification Section	SD #	Submittal Description	Item Submitted	Paragraph #	Classification: GOVT or A/E Revwr	Submit	Approval Needed By	Material Needed By	Action Code	Date Of Action	Date FWD to APPR / Auth Date RCD From CONTR	Date FWD To Other Revwr	Date RCD From Other Revwr	Action Code	Date Of Action	Mailed To CONTR/ Date RCD From APPR Authority	Remarks
1,514			44 11 37		Shop Drawings	Submitted shop drawings shall include a clear indication of the expected range of air exhaust generated by the entire system (provided in cubic feet per minute) as measured at the source of each exhaust hose, capture hood, or vacuum port when the submitted equipment is functioning under the widest range of reasonably expected operating conditions. Submitted shop drawings shall also contain expected static pressures of the system, expected air velocities generated by the system, pertinent cross sectional areas, and calculations used to determine performance of the system	1.5.D.3														
1,515			44 11 37		Shop Drawings	A copy of ductwork shop drawings, indicating all ductwork connected to the equipment specified herein. This copy shall be submitted to the equipment consultant for informational purposes only, not requiring approval from the equipment consultant	1.5.D.4													
1,516			44 11 37		Test Reports	Provide to the equipment consultant a copy of all testing and balancing (TAB) reports that specifically refer to mechanical systems physically connected to equipment specified herein. This copy shall be submitted to the equipment consultant for informational purposes only, not requiring approval from the equipment consultant. Refer to appropriate specification Section 23 05 93 Testing, Adjusting, and Balancing for HVAC for information on TAB report requirements, as well as Part 3.03 Testing, of this specification below	1.5.E													
1,517			44 11 37		Warranty	Submit warranties in accordance with Division 1 - General Requirements of these specifications.	1.7.D													

SECTION 01 33 00.13 – DOCUMENT CONTROL

Part 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 022 Specification Sections, apply to this Section.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01, Section 01 26 00 “Contract Modification Procedures” for administrative procedures related to modifications to the Contract.

2. Division 01 Section 01 31 19 "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.

3. Division 01 Section 01 32 16.13 "CPM Schedules" for requirements for CPM scheduling and reporting progress of work.

4. Division 01 Section 01 32 33 "Photographic Documentation" specifies requirements for submittal of periodic construction photographs.

5. Division 01 Section 01 33 00 “Submittals” specifies the requirements for governing the overall preparation and submission of required submittals, including but not limited to Metro-North Railroad submittals, United Illuminating submittals and FM Global submittals.

6. Division 01 Section 01 77 00 "Closeout Procedures" specifies requirements for submittal of Project Record Documents and warranties at project closeout.

7. Division 01 Section 01 91 00 "Commissioning" specifies requirements for submittal of quality assurance documentation related to commissioning.

1.2 DOCUMENT CONTROL SYSTEM

A. General: 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.

B. The Contractor shall prepare and maintain the contract documentation utilizing the latest version of Primavera Contract Manager (PCM) software (formerly known as Primavera Expedition).

1. The Owner will provide up to five (5) licenses to the Contractor for access to the PCM software. The Costs for these licenses support of the licenses and hosting fees shall be borne by the Owner for this Project.

C. The Contractor will directly access the document control system via the internet. The Owner will provide the Contractor access to the latest version of PCM and a common file server.

D. All references to the use of PCM and the common file server below shall refer to the Owner's shared document control system as described in this Section.

E. All information that resides on the shared document control system shall become the sole property of the Owner.

F. The document control system shall be available for Contractor use at all times unless system maintenance (i.e. backups, upgrades, etc) is being performed.

1. System maintenance will generally be limited to 10 PM – 6AM, Monday - Friday and at various times on weekends.

2. In the event a Contractor's authorized user cannot access the control system, the Contractor shall notify the Owner's control system representative.

3. 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 Owner in hard copy format.

4. The hard copy correspondence must be entered into the control system immediately upon becoming available again.

5. Inability by the Contractor to gain access to the document control system for any reason shall not be grounds for claim.

G. The use of the database is not required for proprietary cost and contract information.

H. Failure by the Contractor to utilize and regularly update the specified PCM 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.

I. 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 Owner's request.

1.3 DOCUMENTATION REQUIREMENTS

A. All correspondence for the project, with the exception of letters, shall be produced, distributed, and controlled using PCM including, but not limited to:

1. transmittals,
2. meeting minutes,
3. requests for information (RFIs),
4. requests for change (RFCs),
5. submittals,
6. answers,
7. reports,

8. agendas,
9. field memos,
10. notices,
11. punch lists.

B. All common correspondence files shall be 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 the Contract, shall be submitted electronically via PCM.

C. The Contractor is responsible to coordinate the overall creation and submission of all project documentation to meet the requirements of the project schedule and specifications.

1. The Contractor is required to be able to make electronic submittals as well as accept and work with electronic submittals marked “Conforms” or “Conforms as Noted”.

2. The Contractor is encouraged to supply the Owner with corporate logos, formats, Sybase Infomaker files, etc. to facilitate the creation and utilization of custom forms and reports.

D. 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.

E. Documents (letters, logs, shop or working drawings, sketches, payrolls, etc) to be transmitted to the Owner 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 PCM.

1.4 DOCUMENT CONTROL SPECIALIST

A. Contractor shall furnish the services of one of his 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 Owner.

B. 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 Owner.

C. The Document Control Specialist shall be knowledgeable of the status of all contract documentation aspects of the work throughout the length of the Contract.

D. The named Document Control Specialist shall be designated as the Submittal Coordinator within PCM 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.

1. A submittal log must be maintained to indicate the latest construction submittals sent and received and the distribution of these drawings to the Owner.

2. Each submittal (shop drawing, working drawing, product data, samples, etc) must be individually entered, tracked, and the status maintained, including all revisions.

3. 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.

1.5 DOCUMENTATION CONTROL SYSTEM ACCESS REQUIREMENTS

A. 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 CTDOT PM to access the document control system.

B. 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 PCM.

C. All Contractor personnel requesting access authorization must complete the minimum training requirements described below and submit a certificate of completion to the Owner. Upon receipt of the request (with training certificate(s)) and approval thereof, the Owner will issue a username and password to each of the authorized Contractor personnel.

D. The Contractor will ensure that only authorized Contractor personnel access and utilize the control system in a responsible, non-destructive manner.

E. The Contractor shall make every reasonable effort to prevent the disclosure of access information for unauthorized use of the control system.

F. The Owner, at its discretion, may revoke access authorization from any user if it is determined that the user:

1. has used the control system for any other reason than is intended by this specification;

2. is no longer in the Contractor’s employ or associated with the project; or

3. has disclosed their access authorization for use by another person or party for any reason.

G. 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.

H. The Contractor is responsible to ensure that anti-virus software is installed and maintained on any computer accessing the Owner’s document control system.

I. 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 Owner.

J. The Contractor must provide valid individual email addresses for each authorized user to the Owner based upon a MAPI compliant email system, such as Microsoft Outlook or Exchange.

1.6 TRAINING REQUIREMENTS

A. Contractor personnel accessing the document control system must fulfill minimum training requirements as follows: personnel must attend a two (2) day project specific PCM training class provided by PL Logic LLC., 1770 Massachusetts Ave, #628 Cambridge, MA 02140, (Tel 617-494-9900, Web site: www.pllogic.com).

B. The Contractor must supply an acceptable training facility within 15 miles of the project site.

C. Training facility shall have a computer workstation for each student in addition to a computer for the instructor.

D. The instructor computer must be able to project to a screen/wall for classroom illustrations via a digital projector or large screen monitor (Minimum 40”). The computer workstations must be a minimum Pentium 2 GHz with 1 GB of RAM, 16GB free disk space, running Windows 7 or Windows 8. Additional workstation requirements include Microsoft TCP/IP networking protocol and a valid IP address, Microsoft Internet Explorer 8 or higher, Direct X9 class video card16-bit or higher color video, and 800x600 video resolution minimum.

E. Training facility shall have one (1) database server with the minimum specifications of: Pentium, 1 GHz, 512 MB RAM, 1.5 GB free disk space, running Windows 7 or Windows 8, or Novell 5.x. and one (1) web server with the minimum specifications of: Pentium 2 GHz, 1 GB RAM, 5 GB free disk space, running Windows 7 or Windows 8, Microsoft TCP/IP networking with a permanent IP address, the port for the web server requests is 80 (the port is configurable, although port 80 is recommended), a local user account (local to the domain) on the server with read rights to the PCM report and forms directories, and access to the database server.

1. The database server and web server cannot run on the same hardware.

F. The costs of all Contractor personnel training and the training facility are the responsibility of the Contractor.

G. Any additional training required as a result of adding additional or replacing existing Contractor staff, including additional costs associated with meeting hardware requirements to run the latest version of the software at that time, shall be included in the Contractor’s costs.

1.7 SUBMITTAL TRANSMITTAL

A. Transmittal of Submittals: Unless otherwise stipulated, all submittals requiring review for conformance with the Contract shall be transmitted electronically using PCM in accordance with this Section. Submit to Parsons Brinckerhoff, 500 Winding Brook Drive, Glastonbury, CT 06033, Attention: Mr. Gene Allen.

1.8 SUBMITTAL LOG

A. The Contractor shall maintain a submittal log to track all construction submittals required for the Project.

1. The submittal log shall include all of the construction submittals sent and received and the distribution of these drawings to the Owner, the Metro-North Railroad and the Engineer.

2. Updates to the submittal log shall be prepared by the Contractor and distributed to the Owner, the Metro-North Railroad, and the Engineer on a weekly basis.

B. At a minimum, the submittal log should include the Submittal Package Number, Title, Status, Required Start, and Required Finish.

1. The Package status shall initially be “Unsubmitted”. Upon submission of any submittal within the package, the status should be changed to “Open”.

2. 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.

3. The 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 12 or 60 days later, as appropriate).

4. Upon receipt of all final review comments for all package submittals, the status should be changed to “Conforms”, “Conforms as Noted”, “Revise & Resubmit”, “Rejected” or “No Action Required”, in accordance with the Engineer’s review.

1.9 SUBMITTAL PACKAGES

A. The Submittal Package Number shall be formatted as follows:

1. CXXXXXX-YY where the where the “XXXXXX” is the six (6) digit CSI specification section number preceded by a “C” (for a total of 7 characters) and “YY” designates a unique grouping ID starting with 00, 01, 02, 03, etc.

a. The grouping ID is meant for use with items that will require a large quantity of submittals (structural steel, rebar, etc.) and allows for a manageable and meaningful separation of these submittal items.

b. Example: For a structural steel framing submittal, the Package No. would be the CSI specification section preceded by a “C”, namely C051200, followed by the unique grouping ID starting with 00, 01, etc. The Submittal Number would therefore be C051200-01-002 for the second submittal in group 01.

2. No submittals will be accepted using a 7-digit item number for the submitted item; CSI numbers must be used.

3. Provide a Submittal Title and complete the remaining fields in PCM as appropriate.

4. Work flow for the submittals shall be completed based on the document flow charts included in the PCM documentation.

B. The Submittal 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
C032000-01	Deformed Steel Bars – Epoxy Coated / Abutment 2
C032000-02	Deformed Steel Bars – Epoxy Coated / PN-13
C032000-03	Deformed Steel Bars – Epoxy Coated / PN-14

C. Instances where a submittal requires review by more than one department or agency (e.g., requiring both CTDOT and MNR reviews), the multiple reviewers option in PCM must be checked so that the individual reviewers can be designated, with each receiving a copy of the submittal for review.

1.10 SUBMITTAL ITEMS

A. All submittal items, as required by contract, must be individually entered, including shop and working drawings, product data, samples, etc. All submittals shall be associated with and generated within a specific package. The submittal number shall be the submittal package number followed by a three digit incremental number (i.e. C032000-03-001, C051200-01-002). The Title shall be a clear description of the submittal item.

1. 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.

B. 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 Engineer for review.

1. The Contractor shall sign and submit the Submittal Register Form 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.”

2. 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.

3. Shop drawings submitted without this signed statement will be rejected immediately and returned to the Contractor.

C. 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 PCM to the first submittal. The drawings shall be listed individually thereafter.

D. Working drawings shall be submitted in Adobe Acrobat PDF format. The PDF package shall be listed and attached in PCM to the first submittal. The drawings shall be listed individually thereafter.

E. 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).

F. Submittal of samples for review and approval by the Engineer shall be submitted using the PCM-generated transmittal. The Contractor shall ship the quantity of physical samples required by the contract to the Engineer with the hard copy of the transmittal. The Engineer shall generate the return transmittal in PCM (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 Engineer shall retain one set of samples marked "Conforms" or "Conforms as Noted", transmit one set of same to the Owner, and transmit the remaining sets of same to the Contractor.

G. 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).

H. Review cycles will be numbered 001, 002, 003, etc. according to the number of resubmissions.

I. Distributions (submittal recipients) must be listed on the transmittal.

J. Hard copies of all submittals marked "Conforms" or "Conforms as Noted" shall be transmitted within 5 working days as follows:

# of Copies	Send To:
3	ConnDOT District Office
3	Metro North Railroad
1	Commissioning Agent (if reviewed)
1	State Building Official (if needed)

K. Letters:

1. The Contractor shall submit hard copies of all letters signed in ink with any attachments to the addressee (original) and the CTDOT PM (copies) for its records.

2. Scans of signed letters and their attachments shall be stored in PCM by the Contractor.

L. Other Submittals

1. 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 Owner to transmit to the State Building Officials for their records.

2. Scanned copies of these conformed shop submittals or other electronic copies will be stored by the Contractor in PCM.

3. The Contractor shall submit hard copies and electronic copies of Maintenance Manuals and Warranties..

1.11 SUBMITTAL SCHEDULE:

A. After development and review by the Owner and Construction Administrator acceptance of the Contractor's Construction or CPM schedule, the Submittal Coordinator shall prepare a complete schedule of 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:

1. Submittal Packages Summary Report

2. Submittal Bar Chart Report

B. The submittal schedule will be created by the Contractor and maintained in PCM as follows:

1. 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).

2. 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.

3. 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

4. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction or CPM Schedule. The Required Start and Required Finish dates must be coordinated with the project CPM schedule

5. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Construction Administrator and additional time for handling and reviewing submittals required by those corrections.

6. Prepare the schedule in chronological order. Provide the following information:

a. Submittal Number

b. Status
c. Required Start
d. Required Finish
e. Schedule date for the initial submittal.
f. Related section number.
g. Submittal category (Shop Drawings, Product Data, or Samples).
h. Name of Subcontractor.
i. Submittal Title/Description of the part of Work covered.
j. Scheduled date for resubmittal.
k. Scheduled date for the Construction Administrator's final release of approval.

7. **Initial Submittal:** Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

8. **Final Submittal:** Submit concurrently with the first complete submittal of Contractor's construction schedule.

9. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

10. Whenever multiple Contractor submittals are under review by the Owner, the Contractor shall prioritize the submittals and notify the Owner thereof.

11. The Owner shall not be held responsible for any delay associated with the approval or rejection of any substitution or other revisions proposed by the Contractor.

12. **Schedule Updating:** Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Submit all submittal items required for each specification section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same specification section as separate packages under separate transmittals.

4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

l. Engineer and Construction Administrator reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

1.12 SUBMITTAL PROCESSING

A. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

B. The processing workflow, as noted in the PCM documentations 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.

C. Shop Drawing Submittals:

1. Initial Review: The Owner 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, Metro-North Railroad (MNR), etc.) shall be allocated a minimum of sixty (60) calendar days (using a 7-day calendar, exclusive of holidays). Any submittals requiring approval by FM Global or the Commissioning Agent shall be allocated a minimum of twenty-eight (28) calendar days (using a 7-day calendar, exclusive of holidays).

a. Refer to Section 01 33 00, “Submittal Procedures”, for Contractor submittals required by Metro-North Railroad, FM Global, United Illuminating, the CTDOT Project Manager or submittals requiring review for conformance with the Environmental Contract.

b. Refer to Section 01 91 00, “Commissioning”, for submittals requiring Commissioning Agent approval.

c. Allow additional time if coordination with subsequent submittals is required.

d. Construction Administrator will advise Contractor when a submittal being processed must be delayed for coordination with related submittals not yet received.

e. Additional time will be required if processing must be delayed to permit review of related subsequent submittals.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow twenty one (21) calendar days for Owner review of each resubmittal. For reviews by FM Global or the commissioning agent, allow twelve (12) calendar days for the review of resubmitted items. Resubmittal reviews by outside agencies shall be allocated a minimum of sixty (60) calendar days.

    a. All resubmissions shall be numbered with the original submittal number but designated a new revision number.

    b. 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.

4. Mass Submittals: Six (6) or more submittals in one (1) day or twenty (20) or more submittals in one (1) week. If “Mass Submittals” are received, Engineer’s review time stated above may be extended as necessary to perform proper review. Engineer will review “Mass Submittals based upon priority determined by CTDOT PM after consultation with Owner and Contractor.

5. Distribution: Following response to the initial submittal, print and distribute copies to the CTDOT PM, Engineer, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

6. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

D. Requests for Information:

1. A "Requests for Information Response" shall be issued within ten (10) days (using a 7-day calendar, exclusive of holidays) of receipt of the request from the Contractor unless the Owner determines that a longer time is necessary to provide an adequate response. Requests for Information requiring information from outside agencies shall be allocated twenty-one (21) days (using a 7-day calendar, exclusive of holidays) of response time.

    a. If a longer time is determined necessary by the Owner, the Owner will, within ten (10) days of receipt of the request, notify the Contractor of the anticipated response time.

    b. If the Contractor submits a "Request for Information" on an activity with ten (10) days (or twenty-one (21) days for an item requiring information from an outside agency) or less of float on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Architect to respond to the request provided that the Architect responds within the ten (10) days (or twenty-one (21) days, if applicable) set forth above.

E. Change Order Proposals:

1. The Owner shall be allocated a minimum of thirty (30) calendar days (using a 7-day calendar, exclusive of holidays) for review and response to each Change Order Proposal submitted. Change Order Proposals requiring information from outside agencies shall be allocated sixty (60) days (using a 7-day calendar, exclusive of holidays).

2. The Owner reserves the right to reject any Change Order Proposals submitted in the form of an RFI for the purpose of reducing the Owner's review and response time. Such documents will not be considered for review by the Owner and will be returned to the Contractor for resubmission. Review and response time for such document will commence upon resubmission in the correct format.

END OF SECTION

SECTION 01 35 13 SPECIAL PROJECT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. General project coordination procedures.

2. Railroad Specifications

3. Work on Railroad Property

4. Utilities

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 11 00 Summary of Work

2. Division 01 Section 01 18 13 Utility Service Connections

3. Division 01 Section 01 32 16.13 "CPM Schedules" for requirements for CPM scheduling and reporting progress of work.

PART 2 - PRODUCTS NOT USED

PART 3 – EXECUTION

3.1 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.

3.2 NOTICE TO CONTRACTOR - WORK ON RAILROAD PROPERTY

The Contractor acknowledges that a portion of the work to be accomplished under this Contract is to be performed on Railroad territory, which consists of territory operated by Metro-North

Railroad and Shore Line East, operated by Amtrak. Refer to Section 01 11 00 for requirements specific to working on railroad property.

3.3 NOTICE TO CONTRACTOR - UTILITIES

The Contractor is hereby notified that all new utility alignments on this project have been coordinated both horizontally and vertically to eliminate conflicts during construction. Any changes to the alignment of one utility could affect multiple utilities and shall be approved by the CT DOT Project Manager.

3.4 NOTICE TO CONTRACTOR – UNDERGROUND UTILITIES

The work to be accomplished under this Contract is to be performed within the New Haven Rail Yard. Call-Before-You-Dig (CBYD) does not coordinate the mark out of any underground utilities located within the Rail Yard, with the exception of Compressed Natural Gas (CNG) installed by the Southern Connecticut Gas Company (SCGC). The Contractor is responsible for locating all other utilities throughout the Rail Yard, prior to performing any excavations.

3.5 NOTICE TO CONTRACTOR – ELECTRIC POWER

The Contractor is hereby notified that all temporary electrical power installations must be grounded per the National Electric Code 2012.

Temporary electrical power installations must comply with MetroNorth standards.

3.6 NOTICE TO CONTRACTOR – PROTECTION OF EXISTING UTILITIES

The utilities within the limits of the New Haven Rail Yard are owned by The State of Connecticut/Metro-North Railroad, except for the gas service, which is owned up to the building connections by The Southern Connecticut Gas Company (SCG).

It should be noted that the work included under this contract may require the relocation of utility installations and the removal of previously abandoned utilities within the limits of the New Haven Rail Yard

The Contractor shall be aware that before, during, and after the completion of the project, there are several other ongoing independent projects adjacent to and within the project limits. These projects are as listed in Section 01 11 00, NOTICE TO CONTRACTOR - WORK ON RAILROAD PROPERTY. These projects may include the relocation of existing utilities and the installation of new facilities. It should be noted that the Contractor's activities may overlap the activities of the contractors engaged in the execution of the other projects, as well as the activities of State of Connecticut, Metro-North Railroad, Amtrak and other railroad and utility company personnel.

The Contractor shall completely coordinate his operations with the affected utility companies and/or agencies, and ensure that his work is coordinated with that of the other contractors. The coordination of the work is the complete responsibility of the Contractor. When the work required under his contract is in conflict with work being carried out by another contractor or agency, it is the responsibility of the Contractor to notify the CT DOT Project Manager immediately of the conflict.

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

The Contractor shall notify "Call Before You Dig", telephone 1-800-922-4455 for the location of public utility, in accordance with Section 16-345 of the Regulations of the Department of Utility Control. Refer to NOTICE TO CONTRACTOR – UNDERGROUND UTILITIES above for additional information.

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

Contractors are cautioned that it is their responsibility to verify locations, conditions, and field dimensions of all existing features, as actual conditions may differ from the information shown on the Contract Documents or contained elsewhere in the specifications. Verifications may require the excavation of exploratory test pits.

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

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

Any damage to any existing private or public utility, as a result of the Contractor's operations, shall be repaired to the Utility's and the CT DOT Project Manager's satisfaction at no cost to the State or the Utility, including all materials, labor, etc., required to complete the repairs.

The Project work shall not commence until the Contractor has made all arrangements necessary to protect all property and facilities adjacent to the Project site, including, but not limited to, those of utilities, from damaging or disruptive effects of Project operations. The Contractor shall cooperate with the owners of any underground or overhead utility lines in their removal and rearrangement operations in order that these operations may progress in a reasonable manner, that duplication of such utilities work may be kept to a minimum, and that services rendered by those parties will not be unnecessarily interrupted.

In the event of interruption of water or utility services as a result of accidental breakage of facilities, or as a result of related facilities being exposed or unsupported, the Contractor shall promptly notify the proper utility and law enforcement authorities and the CTDOT PM of same. The Contractor shall cooperate with said authorities in the restoration of such services as promptly as possible. In no case shall the Contractor leave the site until the interrupted service has been restored. Fire hydrants shall be kept accessible at all times, and no materials shall be left within 15 feet of any fire hydrant.

Prior to opening an excavation, effort shall be made to determine whether underground installations, i.e., water, sanitary, gas, electric ducts, communication ducts, etc., will be encountered and, if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, the exact location shall be determined by careful probing or hand digging, and when it is uncovered, proper supports shall be provided for the existing installation. Utility companies shall be contacted and advised of proposed work prior to the start of actual excavation, as noted above. Note that test pits have been dug at several locations throughout the project. The test pit data is included in the Contract Documents.

END OF SECTION 01 35 13

SECTION 01 35 26 GOVERNMENT SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Construction Documents and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

A. This guide specification covers construction safety requirements and requirements for the protection of people, property, and resources.

B. **Related Sections:** The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 11 00 Summary of Work includes requirements for performing work on or adjacent to the right of way of the railroad

2. Division 01 Section 01 33 00 Submittal Procedures specifies the requirements for submittal requirements;

3. Division 01 Section 01 33 00.13 Document Control for requirements related submissions and the use of the Primavera Construction Manager.

4. Division 01 Section 01 31 19 "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE) **www.asse.org/publications/**	
ASSE/SAFE A10.32	(2004) Fall Protection
ASSE/SAFE A10.34	(2001; R 2005) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE Z359.1	(2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) **www.asme.org/Codes/**	
ASME B30.22	(2005) Articulating Boom Cranes
ASME B30.3	(2004) Construction Tower Cranes
ASME B30.5	(2004) Mobile and Locomotive Cranes
ASME B30.8	(2004) Floating Cranes and Floating Derricks

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) **www.nfpa.org/**	
NFPA 10	(2007) Portable Fire Extinguishers
NFPA 51B	(2009) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 241	(2004) Safeguarding Construction, Alteration, and Demolition Operations
NFPA 70	(2008) National Electrical Code
NFPA 70E	Standard for Electrical Safety in the Workplace
CODE OF FEDERAL REGULATIONS (CFR) **www.archives.gov/federal-register/cfr/**	
10 CFR	Standards for Protection Against Radiation
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.28	Safety Requirements For Scaffolding.
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910.147	Control Of Hazardous Energy (Lockout/Tagout)
29 CFR 1910.178	Powered industrial trucks.
29 CFR 1915	Confined and Enclosed Spaces and Other
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.500	Fall Protection
29 CFR 1926.550	Cranes and Derricks
US Army Core of Engineers (USACE) **www.iwr.usace.army.mil**	
EM 385-1-1	Safety, and Health Requirements Manual (2008),

1.4 SUBMITTALS

A. Submittals:

1. Preconstruction Submittals:

a. Accident Prevention Plan (APP)

b. Activity Hazard Analysis (AHA)

c. Crane Critical Lift Plan

d. Proof of qualification for Crane Operators

2. Test Reports: Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

a. Accident Reports;

b. Monthly Exposure Reports;

c. Crane Reports;

d. Regulatory Citations and Violations;

e. Gas Protection.

3. Certificates:

a. Confined Space Entry Permit;

b. Hot work permit;

c. License Certificates.

d. Certificate of Compliance – Crane

1.5 DEFINITIONS

A. Competent Person. A 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.

B. Competent Person for Fall Protection. A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as their application and use with related equipment, and has the authority to take prompt corrective measures to eliminate the hazards of falling.

C. Confined Space: A space which by design has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces include, but are not limited to storage tanks, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines.

D. High Visibility Accident: Any mishap which may generate publicity and/or high visibility.

E. Medical Treatment; Medical treatment includes treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

F. Operating Envelope: The area surrounding any crane. Inside this "envelope" is the crane, the operator, riggers and crane walkers, rigging gear between the hook and the load, the load and the crane's supporting structure (ground, rail, etc.).

G. Qualified Person for Fall Protection: A person with a recognized degree or professional certificate and with extensive knowledge, training and experience in the field of fall protection; who is capable of performing design, analysis, and evaluation of fall protection systems and equipment.

H. Recordable Injuries or Illnesses: Any work-related injury or illness that results in:

1. Death, regardless of the time between the injury and death, or the length of the illness;

2. Days away from work (any time lost after day of injury/illness onset);

3. Restricted work;

4. Transfer to another job;

5. Medical treatment beyond first aid;

6. Loss of consciousness; or

7. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

I. Weight Handling Equipment (WHE) Accident: A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and/or collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered an accident even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.).

1.6 REGULATORY REQUIREMENTS

A. In addition to the detailed requirements included in the provisions of this Section see, **Division 01, Section 01 42 20 "Reference Standards and Definitions"** for other state laws, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, regulations, and referenced documents vary, the most stringent requirements govern.

1.7 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

A. Personnel Qualifications:

B. Site Safety and Health Officer (SSHO):

Provide a Site Safety and Health Officer (SSHO) at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The Contractor Quality Control (QC) person cannot be the SSHO on this project, even though the QC has safety inspection responsibilities as part of the QC duties.

Meet the following requirements within the SSHO:

A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects. 30-hour OSHA construction safety class or equivalent within the last five (5) years. An average of at least 24 hours of formal safety training each year for the past five (5) years with training for competent person status for at least the following areas of competency: excavation, scaffolding, fall protection, hazardous energy, confined space, health hazard recognition, evaluation and control of chemical, physical and biological agents, personal protective equipment and clothing to include selection, use and maintenance.

C. Certified Safety Professional (CSP) and Certified Industrial Hygienist (CIH):

Provide a Certified Safety Professional (CSP) and Certified Industrial Hygienist (CIH) at the work site to perform safety and occupational health management, surveillance,

inspections, and safety enforcement for the Contractor. The CSP and CIH shall be the safety and occupational health "competent person" as defined by this section. The CSP and CIH shall have no other duties than safety and occupational health management, inspections, and/or industrial hygiene.

E. Crane Operators:

Meet the crane Operators and Crane operation requirements of the Connecticut Bureau of License and Permits – Cranes, Department of Construction Services, Office of State Fire Marshal pursuant to C.G.C § 29-221 through 29-230. Provide proof of current license and qualification. For more information visit the CT DCS Website **www.ct.gov/dcs** and click on "Office of the State Fire Marshall" or call **(860) 685-8470**.

F. Personnel Duties:

1. **Site Safety and Health Officer (SSHO):**

   a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.

   b. Conduct mishap investigations and complete required reports. Maintain the **OSHA Form 300 and Daily Production** reports for prime and sub-contractors. For more information visit the OSHA website at **www.osha.gov.**

   c. Maintain applicable safety reference material on the job site.

   d. Attend the pre-construction conference, pre-work meetings including preparatory inspection meeting, and periodic in-progress meetings.

   e. Implement and enforce accepted APPS and AHAs.

   f. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. Post a list of unresolved safety and health deficiencies on the safety bulletin board.

   g. Ensure sub-contractor compliance with safety and health requirements.

   Failure to perform the above duties will result in dismissal of the superintendent and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

2. **Certified Safety Professional (CSP) Certified Industrial Hygienist (CIH)**

   a. Perform safety and occupational health management, surveillance, inspections, and safety enforcement for the project.

   b. Perform as the safety and occupational health "competent person" as defined by this section.

   c. Be on-site at least weekly **.** whenever work or testing is being performed.

   d. Conduct and document safety inspections.

   e. Shall have no other duties other than safety and occupational health management, inspections, and enforcement on this contract.

G. Meetings:

1. Preconstruction Conference:

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the Accident Prevention Plan (APP); (including the Activity Hazard Analyses (AHAs), and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Owner's Representative(s) as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.

c. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

2. Safety Meetings:

Safety meetings shall be conducted to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent safety and health training and motivation.

a. Meetings shall be conducted at least once a month for all supervisors on the project location and at least once a week for all workers by supervisors or foremen.

b. Meetings shall be documented, including the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Documentation shall be maintained and copies furnished to the CT DOT Project Manager on request.

c. The CT DOT Project Manager shall be informed of all scheduled meetings in advance and be invited to attend.

1.8 ACCIDENT PREVENTION PLAN (APP):

A. Use a qualified person to prepare the written site-specific APP.

1. Prepare the APP in accordance with the format and requirements of **US Army Corps of Engineers (USACE), Safety, and Health Requirements Manual, EM 385-1-1,** or as approved by the CT DOT Project Manager and as supplemented herein. Cover all paragraphs and subparagraph elements in **USACE EM 385-1-1, Appendix A, "Minimum Basic Outline for Accident Prevention Plan"** or as approved by the CT DOT Project Manager. The USACE Safety, and Health

Requirements Manual, EM 385-1-1 is available at the USACE Website **www.iwr.usace.army.mil.**

2. Specific requirements for some of the APP elements are described in **"B"** below. The APP shall be job-specific and address any unusual or unique aspects of the project or activity for which it is written.

B. The APP shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and made site-specific. The Owner considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the trade contractors. Contractors are responsible for informing their trade contractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting trade contractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer and any designated Certified Safety Professional (CSP) and/or Certified Industrial Hygienist (CIH).

C. Submit the APP to the CT DOT PM Fourteen (14) Calendar Days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once accepted by the CT DOT Project Manager, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the CT DOT Project Manager, until the matter has been rectified. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the CT DOT Project Manager, project superintendent, Site Safety and Health Officer **(**SSHO) and quality control manager. Should any hazard become evident, stop work in the area, secure the area, and develop a plan to remove the hazard. Notify the CT DOT Project Manager within Twenty (24) hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by **American Society of Safety Engineers**, **ASSE/SAFE A10.34 - Protection of the Public on or Adjacent to Construction Sites, see www.asse.org**) and the environment.

Copies of the accepted plan will be maintained at the CT DOT Project Manager's office at the job site. Continuously reviewed and amended the APP, as necessary, throughout the life of the contract. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered.

D. **APP Contents:**
The contents of the Accident Prevention Plan (APP) shall be in accordance with **Appendix A** of the US Army Corps of Engineers, **EM 385-1-1 Safety and Health Requirements Manual**, Appendix A, Minimum Basic Outline for Accident Prevention Plans or as approved by the CT DOT Project Manager. For more information visit the USACE Website at **www.usace.army.mil/Library.**

1.9 **ACTIVITY HAZARD ANALYSIS (AHA):** Activity Hazard Analyses (AHAs) define the activities being performed and identify the sequences of work, the specific hazards anticipated, site conditions, equipment, materials, and the control measures to be implemented to eliminate or

reduce each hazard to an acceptable level of risk. The Activity Hazard Analysis (AHA) format shall be in accordance with US Army Corps of Engineers, **EM 385-1-1 Safety and Health Requirements Manual** or as approved by the CT DOT Project Manager.

A. Submittals:

1. Submit initial AHA to CT DOT Project Manager for review at least (15) fifteen Calendar Days prior to the start of each phase. Format subsequent AHAs as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

2. The AHA list will be reviewed monthly at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. Any activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier or trade contractor and provided to the prime contractor for submittal to the CT DOT Project Manager.

1.10 DISPLAY OF SAFETY INFORMATION

Within one (1) Calendar Day after commencement of work, erect a safety bulletin board at the job site. Include and maintain information on safety bulletin board as required by US Army Corps of Engineers, **EM 385-1-1 Safety and Health Requirements Manual**, Section 01.A.06 or as approved by the CT DOT Project Manager. Additional items required to be posted include:

A. Confined space entry permit.

B. Hot work permit.

1.11 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the article "References." Maintain applicable equipment manufacturer's manuals.

1.12 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. The Owner has no responsibility to provide emergency medical treatment.

1.13 REPORTS

A. Accident Reports

1. Conduct an accident investigation for recordable injuries and illnesses, and property damage accidents resulting in at least Two Thousand Dollars ($2,000) in damages, to establish the root cause(s) of the accident, complete “Accident Report Form” approved by the CT DOT Project Manager. Provide the report to the CT DOT Project Manager within 5 (five) Calendar Days of the accident.

B. Accident Notification

Notify the CT DOT Project Manager as soon as practical, but not later than four hours (4), after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $2,000, or any weight handling equipment accident.

1. Within notification include the following:
   a. contractor name;
   b. contract title;
   c. type of contract;
   d. name of activity,
   e. installation or location where accident occurred;
   f. date and time of accident;
   g. names of personnel injured**;**
   h. extent of property damage, if any; extent of injury, if known, and brief description of accident to include type of construction equipment used, Personal Protective Equipment (PPE) used, etc. . Preserve the conditions and evidence on the accident site until the U.S. Department of Labor, Occupational Safety and Health Administration (USDOL-OSHA) investigation team arrives on-site and USDOL-OSHA investigation is conducted.

C. Monthly Exposure Reports

Monthly exposure reporting to the CT DOT Project Manager is required to be attached to the monthly Application for Payment request. This report is a compilation of employee-hours worked each month for all site workers, both prime and trade contractor. Provide on a form approved by the CT DOT Project Manager.

D. Crane Reports

Submit crane inspection reports on a form approved by the CT DOT Project Manager and as specified herein with Daily Reports of Inspections.

E. HOT WORK

Hot Work shall only be performed in accordance with the requirements of **NFPA 51B "Fire Prevention During Welding, Cutting and Other Hot Work Standard.**

1. **Definitions:**
   a. **Hot Work:** Work involving burning, welding, or a similar operation that is capable of initiating fires or explosions. Examples listed by NFPA include arc welding, oxygen- fuel gas welding, open-flame soldering, brazing, thermal spraying, oxygen cutting, and arc cutting.

   b. **Permit Authorizing Individual (PAI).** Means the individual designated by the Contractor to authorize hot work. The PAI is permitted to be, among others, the Contractor's project executive, supervisor, foreperson, or designated safety administrator. The PAI CANNOT be the hot work operator, except as permitted in **NFPA 51B**. The PAI is aware of the fire hazards involved and is familiar with the provisions of this standard.

2. **Permit:** Submit and obtain a written permit from the PAI prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing

devices, from the PAI. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. The Contractor will provide at least two (2) twenty (20) pound 4A:20 BC rated extinguishers for normal "Hot Work". All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal.

3. **Fire Watch:** It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch shall be trained in accordance with **NFPA 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work** and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit. When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the local fire department emergency phone number(s).

   ANY FIRE, NO MATTER HOW SMALL, SHAL BE REPORTED TO THE LOCAL FIRE DEPARTMENT, GENERAL CONTRACTOR'S AUTHORIZED REPRESENTATIVE, AND CT DOT Project Manager IMMEDIATELY.

1.14 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the state User Agency shall not be closed or obstructed without written permission from the CT DOT Project Manager.

1.15 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

A. Secure outside equipment and materials and place materials that could be damaged in protected areas.

B. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities. Check that all materials are moved out of the flood plain. Hazardous materials must not be stored.

C. Ensure that temporary erosion controls are adequate.

PART 2- PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

Comply with the Connecticut State Building and Fire Safety Codes, OSHA regulations, and other references regulations. The most stringent standard prevails.

A. HAZARDOUS MATERIAL EXCLUSIONS

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with **USACE EM 385-1-1** such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited. The CT DOT Project Manager, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials.

B. UNFORESEEN HAZARDOUS MATERIAL

1. Related Section: Division 01, Section 01 35 16, Alteration Project Procedures.

3.2 PRE-OUTAGE COORDINATION MEETING Contractors are required to apply for utility outages at least fifteen (15) Calendar Days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, attend a pre-outage coordination meeting with the CT DOT Project Manager, User Agency Representative, and Public Utilities representative to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 SAFETY LOCKOUT / TAGOUT PROCEDURES

A. The Contractor shall ensure that each employee is familiar with and complies with these procedures and **OSHA 29 CFR 1910.147 Control Of Hazardous Energy (Lockout/Tagout).**

1. The Contractor's “Authorized Employee” shall apply lockout/tagout tags and take other actions that, because of experience and knowledge, are known to be necessary to make the particular equipment safe to work on.

2. No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tagout tag attached to it, nor shall such tag be removed except as provided in this section.

3. No person shall work on any equipment that requires a lockout/tagout tag unless he, his immediate supervisor, project leader, or a subordinate has in his possession the stubs of the required lockout/tagout tags. Only qualified personnel shall perform work on electrical circuits.

4. A supervisor who is required to enter an area protected by a lockout/tagout tag will be considered a member of the protected group provided he notifies the holder of the tag stub each time he enters and departs from the protected area.

5. Identification markings on building light and power distribution circuits shall not be relied on for established safe work conditions.

6. Before clearance will be given on any equipment other than electrical (generally referred to as mechanical apparatus), the apparatus, valves, or systems shall be secured in a passive condition with the appropriate vents, pins, and locks. Pressurized or vacuum systems shall be vented to relieve differential pressure completely. Vent valves shall be tagged open during the course of the work. Where dangerous gas or fluid systems are involved, or in areas where the environment may be oxygen deficient, system or areas shall be purged, ventilated, or otherwise made safe prior to entry.

B. Tag Placement

Lockout/tagout tags shall be completed in accordance with the regulations printed on the back thereof and attached to any device which, if operated, could cause an unsafe condition to exist. If more than one group is to work on any circuit or equipment, the employee in charge of each group shall have a separate set of lockout/tagout tags completed and properly attached. When it is required that certain equipment be tagged, the State of Connecticut Authority Having Jurisdiction will review the characteristics of the various systems involved that affect the safety of the operations and the work to be done; take the necessary actions, including voltage and pressure checks, grounding, and venting, to make the system and equipment safe to work on; and apply such lockout/tagout tags to those switches, valves, vents, or other mechanical devices needed to preserve the safety provided. This operation is referred to as "Providing Safety Clearance."

C. Tag Removal

When any individual or group has completed its part of the work and is clear of the circuits or equipment, the supervisor, project leader, or individual for whom the equipment was tagged shall turn in his signed lockout/tagout tag stub to the Contractor. That group's or individual's lockout/tagout tags on equipment may then be removed on authorization by the Contractor.

3.4 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

Establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures.

A. Training

Institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protection in accordance with **USACE EM 385-1-1**, Section 21.A.16.

B. Fall Protection Equipment and Systems

Enforce use of the fall protection equipment and systems designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in **USACE EM 385-1-1, section 21.** In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with **USACE EM 385-1-1, paragraphs 05.H. and 05.I**. Personal fall arrest systems are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems are required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel. Fall protection must comply with **OSHA 29 CFR 1926.500, Fall Protection, Subpart M, and ASSE/SAFE A10.32, Fall Protection.**

1. Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet **ASSE/SAFE Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components.** Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. Body belts may only be used as a positioning device system (for uses such as steel reinforcing assembly and in addition to an approved fall arrest system). Harnesses shall have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Only locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber. The maximum free fall distance when using fall arrest equipment shall not exceed 1.8 m 6 feet. The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken

2. Fall Protection for Roofing Work

Implement fall protection controls based on the type of roof being constructed and work being performed. Evaluate the roof area to be accessed for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:
   (i) For work within 6 feet (6 feet (1.8 m) of an edge, on low-slope roofs, Protect personnel from falling by use of personal fall arrest systems, guardrails, or safety nets.
   (ii) For work greater than (6 feet (1.8 m) from an edge, erect and install warning lines in accordance with **OSHA 29 CFR 1926.500, Fall Protection**.

b. Steep-Sloped Roofs: Work on steep-sloped roofs requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also includes residential or housing type construction.

3. Existing Anchorage

Certified (or re-certified) by a qualified person for fall protection existing anchorages, to be used for attachment of personal fall arrest equipment in accordance with **ASSE/SAFE Z359.1, Safety Requirements for Personal Fall**

Arrest Systems, Subsystems and Components. Exiting horizontal lifeline anchorages must be certified (or re-certified) by a registered professional engineer with experience in designing horizontal lifeline systems.

4. Horizontal Lifelines

Design, install, certify and use under the supervision of a qualified person horizontal lifelines for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 **(OSHA 29 CFR 1926.500 Fall Protection).**

5. Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with **29 CFR 1926, Safety and Health Regulations for Construction Subpart M.**

6. Rescue and Evacuation Procedures

When personal fall arrest systems are used, the contractor must ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP).

3.5 SCAFFOLDING

A. The Contractor shall provide all employees with a safe means of access to the work area on the scaffold in accordance with **OSHA 29 CFR 1910.28 Safety Requirements For Scaffolding** and as contained in this section.

1. Climbing of any scaffold braces or supports not specifically designed for access is prohibited.

2. Access scaffold platforms greater than 20 feet (6 m) maximum in height by use of a scaffold stair system.

3. Do not use vertical ladders commonly provided by scaffold system manufacturers for accessing scaffold platforms greater than 20 feet (6 m) maximum in height.

4. The use of an adequate gate is required.

5. Ensure that employees are qualified to perform scaffold erection and dismantling.

6. Do not use scaffold without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan.

7. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.

8. Give special care to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited.

9. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of the scaffold base. Place work platforms on mud sills. Scaffold or work platform erectors shall have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

B. Stilts

The use of stilts for gaining additional height in construction, renovation, repair or maintenance work is **PROHIBITED**.

3.6 EQUIPMENT

A. Material Handling Equipment

Material Handling Equipment shall be in accordance with **OSHA 29 CFR 1910.178 Powered Industrial Trucks** and as contained in this section.

1. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.
2. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.
3. Operators of forklifts or power industrial trucks shall be licensed in accordance with OSHA.

B. Weight Handling Equipment

1. Equip cranes and derricks as specified in **ASME B30.5** or **ASME B30.22** or **ASME B30.8** as applicable.
2. Comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in **ASME B30.5**). Perform all testing in accordance with the manufacturer's recommended procedures.
3. Comply with **ASME B30.5** for mobile and locomotive cranes, **ASME B30.22** for articulating boom cranes, ASME B30.3 for construction tower cranes, and **ASME B30.8** for floating cranes and floating derricks.
4. Under no circumstance shall a Contractor make a lift at or above the equipment's lifting capacity
5. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and follow the requirements of **ASME B30.5** or **ASME B30.22** as applicable.

6. Do not crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane.

7. Inspect, maintain, and recharge portable fire extinguishers as specified in **NFPA 10, Standard for Portable Fire Extinguishers.**

8. All employees must keep clear of loads about to be lifted and of suspended loads.

9. Use cribbing when performing lifts on outriggers.

10. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

11. A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.

12. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by CT DOT Project Manager.

13. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by CT DOT Project Manager.

14. Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

C. USE OF EXPLOSIVES

Explosives shall not be used or brought to the project site without prior written approval from the CT DOT Project Manager. Such approval shall not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations. Storage of explosives, when permitted on State property, shall be only where directed and in approved storage facilities. These facilities shall be kept locked at all times except for inspection, delivery, and withdrawal of explosives. Explosive work shall be performed in accordance with the requirements of C.G.S. § 29-343 through 29-355 and as required by the Office of State Fire Marshal, CT Department of Construction Services.

3.7 EXCAVATIONS

A. Perform soil classification by a competent person in accordance with **29 CFR 1926 Safety and Health Regulations for Construction.**

1. Utility Locations

All underground utilities in the work area must be positively identified by and coordinated in accordance with **Notice to Contractor – Protection of Existing Utilities.** All underground utilities in the work area must be positively identified by a private utility locating service and coordinated with the public utility company. Any markings made during the utility investigation must be maintained by the general Contractor throughout the contract.

2. Utility Location Verification

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. Digging within Two (2) feet of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility expose the utility by hand digging every 100 feet; if parallel within Five (5) feet of the excavation.

3. Shoring Systems

Trench and shoring systems must be identified in the accepted safety plan and AHA. Manufacture tabulated data and specifications or registered engineer tabulated data for shoring or benching systems shall be readily available on-site for review. Job-made shoring or shielding must have the registered professional engineer stamp, specifications, and tabulated data. Extreme care must be used when excavating near direct burial electric underground cables.

4. Trenching Machinery

Operate trenching machines with digging chain drives only when the spotters/laborers are in plain view of the operator. Provide operator and spotters/laborers training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Keep documentation of the training on file at the project site.

3.8 UTILITIES WITHIN CONCRETE SLABS

A. Utilities located within concrete slabs or pier structures, bridges, and the like, are extremely difficult to identify due to the reinforcing steel used in the construction of these structures. Whenever contract work involves concrete chipping, saw cutting, or core drilling, the existing utility location must be coordinated with utility company in addition to a private locating service. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the contractor from meeting this requirement.

3.9 ELECTRICAL

A. Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the CT DOT Project Manager and utility company for identification. The CT DOT Project Manager will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers will be permitted to enter. When work requires Contractor to work near

energized circuits as defined by the **NFPA 70**, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. In addition, provide electrical arc flash protection for personnel as required by **NFPA 70E**. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA.

B. Portable Extension Cords

Size portable extension cords in accordance with manufacturer ratings for the tool to be powered and protected from damage. Immediately remove from service all damaged extension cords. Portable extension cords shall meet the requirements of **NFPA 70.**

3.10 WORK IN CONFINED SPACES

A. Comply with the requirements in **OSHA 29 CFR 1910.146** and **OSHA 29 CFR 1926.21(b) (6).** Any potential for a hazard in the confined space requires a permit system to be used.

1. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.

2. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.

3. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

END OF SECTION 01 35 26

SECTION 01 42 20 REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic contract definitions are included in the General Conditions of the Contract for Construction.

B. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the reader locate the reference. Location is not limited to this term.

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Owner, requested by the Owner, and similar phrases.

D. "Approved": The term "approved," when used in conjunction with the Owner's action on the Contractor's submittals, applications, and requests, is limited to the Owner's duties and responsibilities as stated in the Conditions of the Contract.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, trade contractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term **"experienced,"** when used with the term **"installer,"** means having a minimum of three (3) previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of authorities having jurisdiction.

2. **Trades:** Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

3. **Assigning Specialists:** Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in

those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.

a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.

J. **"Project Site"** is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other Work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. **"Testing Agencies":** A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

L. **"Peer Reviewer":** The independent third party review required reviewing the primary structural system for the Project.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. **Specification Format:** These Specifications are organized into Divisions and Sections based on CSI's "MasterFormat" 49-Division format and numbering system.

B. **Specification Content:** This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. **Abbreviated Language:** Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated, as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.

2. **Streamlined Language:** The Specifications generally use the imperative mood and streamlined language. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

a. The words **"shall be"** are implied where a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

A. **Applicability of Standards:** Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. **Publication Dates:** Comply with the standards in effect as of the date of the Contract Documents unless a specific date is indicated in the Contract Documents or the governing regulations cited herein.

C. **Conflicting Requirements:** Where compliance with two (2) or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent and highest quality requirement. Request a

decision from the Owner before proceeding on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.

1. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum acceptable. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Request a clarification from the Owner regarding uncertainties before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Thompson Gale's "Encyclopedia of Associations," available in most libraries.

1.5 GOVERNING REGULATIONS AND AUTHORITIES

A. Copies of Regulations: Obtain copies of the "latest applicable State Codes" and the following regulations and retain at the Project Site to be available for reference by parties who have a reasonable need during submittals, planning, and progress of the Work, until Substantial Completion.

1. State Building Code 2005 Connecticut Supplement with 2009, 2011, and 2013 Amendments.
2. Connecticut Fire Safety Code.
3. OSHA 29 CFR Part 1910 Occupational Safety and Health Regulations/1999.
4. OSHA 29 CFR Part 1926 Occupational Safety and Health Regulations for Construction/1999.

B. For a list of the "latest applicable State Codes" and how they can be obtained contact the Department of Administrative Services Division of Construction Services at #860-713-5900 or http://www.ct.gov/dcs/cwp/view.asp?a=4447&q=521446&dcsNav and http://www.ct.gov/dcp/cwp/view.asp?a=1629&q=492412 (Connecticut Department of Consumer Protection website).

1.6 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01 42 20

SECTION 01 45 00 QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality-control services.

B. Quality-Control services include fire alarm acceptance testing, inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by the Owner.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

2. Specified inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.

3. Requirements for Contractor to provide quality-control services required by CTDOT PM, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

E. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 33 00 Submittal Procedures specifies requirements for development of a schedule of required tests and inspections.

2. Division 01 Section 01 33 00.13 Document Control for requirements related submissions and the use of the Primavera Construction Manager.

3. Division 01 Section 01 73 29 Cutting and Patching specifies requirements for repair and restoration of construction disturbed by inspection and testing activities.

4. Division 01 Section 01 77 00 Closeout Procedures, specific requirements for contract closeout procedures.

5. Division 28 Section 28 31 11 Digital, Addressable Fire-Alarm System specifies field quality control for the Alarm System.

1.3 RESPONSIBILITIES

A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, the Owner, through the CT DOT Project Manager, shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. All tests required by the individual specification

sections are required to be scheduled and notification given to the CT DOT Project Manager 24/48 hours in advance of the test/inspection as applicable. Costs for these services are not included in the Contract Sum.

1. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.

2. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.

a. Such services include Special Inspections as required by the latest edition of the "Connecticut State Building Code".

b. Where the Owner has engaged a testing agency for testing and inspecting part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner. The Owner will engage the services of a qualified Special Inspector for this project. The Special Inspector, as a representative of the Owner, shall document and confirm compliance with the provisions of the Connecticut State Building Code for Special Inspections.

c. Materials and assemblies for this project will be tested and construction operations inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the State for final acceptance.

d. The Owner’s use of testing and inspection services shall in no way relieve the Contractor of the responsibility to furnish materials and finished construction in full compliance with the Contract Documents and the Connecticut State Building Code.

B. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.

1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated non-compliance with Contract Document requirements.

2. The Owner will issue a credit change order to cover all costs incurred related to all re-tests/re-inspections due to non-compliance to the Contract Documents, including but not limited to the Owner’s costs and the Consultant’s costs.

C. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the Agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:

1. Provide access to the Work.

2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.

3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.

4. Provide facilities for storage and curing of test samples.

5. Deliver samples to testing laboratories.

6. Provide an approved design mix proposed for use for material mixes that require control by the testing agency.

7. Provide security and protection of samples and test equipment at the Project Site.

D. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Sections shall cooperate with the CT DOT Project Manager, Engineer and the Contractor in performance of the testing agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.

1. The testing agency shall notify the CT DOT Project Manager and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. The testing agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.

3. The testing agency shall not perform any duties of the Contractor.

E. Owner will pay for the services of an independent testing agency laboratory to perform inspections, tests and other services required by the Specifications except as noted below, listed for which the Owner will issue a deduct change order to cover the cost associated with these tests:

1. When the Contractor notifies the CT DOT Project Manager and/or Testing Agency less than 24 hours before the expected time of testing.

2. When the Contractor requires testing for his own convenience.

3. When the Contractor schedules a test and is not ready for the required test.

F. Submit reports of tests that are part of the submittal requirements which indicate compliance or non-compliance with the specified standard.

G. Fire Alarm/Acceptance Testing Procedures:

1. For buildings exceeding the threshold limit, the fire alarm testing shall be as the authority having jurisdiction shall dictate. This will be as determined by the State Fire Marshals Office.

2. For buildings that do not exceed the threshold limit, the fire alarm testing shall be as the authority having jurisdiction shall dictate. This will be determined by the Department of Construction Services requirements as set below:

   a. Protective Signaling Systems: All protective signaling systems shall meet with acceptance testing requirements of the applicable standards listed in Section 7-6.1.4, NFPA 101/2003 and NFPA 13/2002.

   b. Prior Test Notification: At least five (5) working days prior to testing, the Fire Alarm Contractor shall notify (in writing) the following people of the proposed date the acceptance tests are to be performed (Also, see Part 2 of Certificate of Compliance).

      - Department of Transportation Team Representative
      - Contractor
      - Engineer of Record
      - Equipment Supplier Representative
      - Sprinkler Contractor

   c. Certificates of Compliance:

1) A Fire Alarm System Inspection and Testing Certification and Description form shall be prepared for each system (See NFPA 72/2002 Chapter 7 and Figure 7-5.2.2).

2) Parts 1 and 3 through 9 shall be completed after the system is installed and the installation of the wiring has been checked. Every alarm device must also be pre-tested to ensure proper operation and correct annunciation at each remote annunciator and control panel. Part 1 of the form (Certification of System Installation) shall be signed by the fire alarm contractor. The signed and completed preliminary copies of the Certification form shall be forwarded to all parties along with the Prior Test Notification.

3) Part 2, of each applicable form, shall be completed after the operational tests have been completed.

4) After the completion of the operational acceptance tests and sign-off of test witness (with stipulations noted), final copies of the Certificates shall be forwarded to the Department of Construction Services Representatives.

d. Tests:

1) All tests shall be conducted in accordance with the Manufacturer's Testing Recommendations.

2) All testing equipment, apparatus (i.e. sound level decibel meter, 2-way radio communication, test devices, ladders, tools, lighting, etc.) and personnel shall be supplied by the Fire Alarm Contractor and Sprinkler Contractor.

e. System Documentation: Every system shall include the following documentation, which shall be delivered to the Department of Transportation representatives upon final acceptance of the system. An owner's manual or manufacturer's installation instructions covering all system equipment, including the following:

1) A detailed narrative description of the system inputs, evacuation signaling, ancillary functions, annunciation, intended sequence of operations, expansion capability, application considerations, and limitations.

2) Operator's instructions for basic systems operations including alarm acknowledgment, system reset, interpreting system output (LED's CRT display, and printout), operation of manual evacuation signaling and ancillary function controls, changing printer paper, etc.

3) A detailed description of routine maintenance and testing as required and recommended and as would be provided under a maintenance contract, including testing and maintenance instructions for each type of device installed. This information should include:

(a) A listing of individual system components that require periodic testing and maintenance.

(b) Step by step instructions detailing the requisite testing and maintenance procedures and the intervals at which those procedures should be performed.

(c) A schedule that correlates the testing and maintenance procedures required by paragraph (2) above and with the listing required by paragraph (1) above.

4) Detailed troubleshooting instructions for each type of trouble condition recognized by the system, including opens, grounds, parity errors, "loop failures," etc. These instructions should include a list of all trouble signals, and step by step instructions describing how to isolate those problems and correct them (or call for service as appropriate).

5) A service directory, including a list of names and telephone numbers for those who should be called to service the system.

f. As-Built REVIT model and As-Built Drawings:

1) The Contractor will produce two (2) sets of as-built drawings and specifications for the fire alarm system, indicating the location (and programmed address, if applicable) of all devices and appliances, the wiring sequences, wiring methods, connection of the components, and sequence of operation of the protective signaling system as installed. The Contractor shall also revise the REVIT model to show as-built conditions and information. These shall be given to the CTDOT PM. This shall be in Accordance with NFPA 72. Refer also to Section 01 77 00 "Closeout Procedures".

1.4 SUBMITTALS

A. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the CT DOT Project Manager. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:

a. Date of issue.

b. Project title and number.

c. Name, address, and telephone number of testing agency.

d. Dates and locations of samples and tests or inspections.

e. Names of individuals making the inspection or test.

f. Designation of the Work and test method.

g. Identification of product and Specification Section.

h. Complete inspection or test data.

i. Test results and an interpretation of test results.

j. Ambient conditions at the time of sample taking and testing.

k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.

l. Name and signature of laboratory inspector.

m. Recommendations on re-testing.

1.5 QUALITY ASSURANCE

A. Qualifications for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are pre-qualified as complying with the

National Voluntary Laboratory Accreditation Program and that specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

B. Mockups: Provide full-size, physical assemblies that are constructed on-site. Mockups will be used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not samples.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 MOCKUPS

A. Build site-assembled mockups using installers who will perform same tasks for project.

B. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by **CT DOT Project Manager**.

2. Notify **CT DOT Project Manager** seven (7) days in advance of dates and times when mockups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain **CT DOT Project Manager's** approval of mockups before starting work, fabrication, or construction.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Demolish and remove mockups when directed, unless otherwise indicated.

3.2 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Division 01 Section 01 73 29 "Cutting and Patching."

B. Protect constructions exposed by or for quality-control service activities, and protect repaired construction.

C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION 01 45 00

SECTION 01 45 23.13 TESTING FOR INDOOR AIR QUALITY, BASELINE INDOOR AIR QUALITY AND MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 specification sections, apply to this section.

1.2 SUMMARY

A. This Section includes the following:

1. Requirements of baseline Indoor Air Quality (IAQ) testing for maximum indoor pollutant concentrations for acceptance of the facility.

2. Requirements for independent materials testing of specific materials anticipated to have major impact on IAQ.

3. Procedures for testing specific construction materials for IAQ performance to assure compliance with specifications. Materials have been identified for independent testing based on the following **three (3)** criteria:

a. Large volume of material used in occupied spaces.

b. The space is occupied during normal working hours.

c. Materials are used in an area where there is recirculating air.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Divisions 01 through Division 44 for sustainable design requirements specific to the Work of each of those sections.

2. Division 23 Section 23 05 93 Testing, Adjusting and Balancing for HVAC for additional requirements for baseline testing for IAQ.

3. Division 23 Section 23 05 93 Testing, Adjusting and Balancing for HVAC for cleaning of HVAC system including duct work, air intakes and returns, and changing of filters.

1.3 REFERENCES

A. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):

1. ASHRAE 52.2-**1999**, with 2007 Addenda Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

B. ASTM International, Inc. (ASTM):

1. ASTM D5116-**2006**, Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.

C. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):

1. IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition 2008.

D. United States Environmental Protection Agency (EPA):

1. Compendium of Methods for the Determination of Air Pollutants in Indoor Air.

1.4 SUBMITTALS

A. Baseline IAQ Testing: Submit a report for each test site specified for IAQ baseline testing as prescribed in Section 23 05 93 "Testing, Adjusting and Balancing for HVAC". Report on air concentrations of targeted pollutants as identified in Table 3.1 below.

B. Product Emissions Test Reports: Submit a report for each material emissions test performed. Report test results in terms of emission factors that will be used by the Owner to model indoor air concentrations. These reports and the modeling data prepared by the Owner shall be included in the closeout documentation specified in Section 01 77 00 "Closeout Procedures".

C. Sustainable Design Documentation Submittals:

1. Construction Indoor Air Quality (IAQ) Management Plan (During Construction)

a. Construction IAQ management plan.

b. Letter confirming if the permanently installed air handling equipment was used during construction.

c. Product data for temporary filtration media. Indicate manufacturer, model number, MERV rating, and location of installed media.

d. Letter confirming that each filtration media was replaced prior to final occupancy.

e. Product data for filtration media to be used during occupancy. Indicate manufacturer, model number, MERV rating, and location of media.

2. Construction Indoor Air Quality (IAQ) Management Plan (Before Occupancy)

a. Signed letter confirming the approach taken by the project (pre-occupancy flush-out; flush-out with early occupancy flush-out or IAQ testing).

b. A narrative describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.

c. Product data for filtration media used during flush-out and during occupancy.

d. A narrative describing the building's IAQ testing process and results including the dates when testing was started and completed.

e. Report from testing and inspecting agency indicating results of IAQ testing and documentation showing conformance with IAQ testing procedures and requirements.

1.5 QUALITY ASSURANCE

A. Perform material tests and report results in accordance with ASTM D5116.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 BASELINE lAQ TESTING

A. HVAC System Verification: To assure compliance with recognized standards for indoor air quality including ASHRAE 62-2004, the Contractor's independent testing and balancing agency shall verify the performance of each HVAC system including space temperature and

space humidity uniformity, outside air quantity, filter installation, drain pan operation, and any obvious contamination sources.

B. Indoor Air Quality Testing: Upon verification of HVAC system operation, the Contractor shall hire an independent contractor, subject to approval by the CT DOT Project Manager, with a minimum of five (5) years experience in performing the types of testing specified herein, to test levels of indoor air contaminants for compliance with specified requirements.

1. Submit a test plan for the approval of the CT DOT Project Manager. The plan shall specify procedures, times, instrumentation, and sampling methods that will be employed.

2. Perform testing in 12 different locations. Contaminant levels are to be measured on each floor of the building in an area agreed upon by the Contractor and the CT DOT Project Manager. Areas with very high outside air ventilation rates such as laboratories are excluded from these testing requirements. The CT DOT Project Manager is the sole judge of areas exempt from testing.

3. Collect air samples on three (3) consecutive days during normal business hours (between the hours of 8:00 AM and 5:00 PM) with building operating at normal HVAC rates. Average the results of each three-day test cycle to determine compliance or non-compliance of indoor air quality for each air handling zone tested.

4. Sample and record outside air levels of formaldehyde and TVOC contaminants at outside air intake of each respective air handling unit simultaneously with indoor tests to establish basis of comparison for these contaminant levels. Indoor testing will be done in the breathing zone; between four (4) and seven (7) feet from the floor.

5. Acceptance of respective portions of the building by the CT DOT Project Manager is subject to compliance with specified limits of indoor air quality contaminant levels.

C. Compliance indoor air quality shall conform to the following standards and limits:

1. Carbon Monoxide: Not to exceed nine (9) ppm.

2. Carbon Dioxide: Not to exceed 800 ppm.

3. Airborne Mold and Mildew: Simultaneous indoor and outdoor readings.

4. Maximum Air Concentration Standards: Indoor room air concentration levels, emission rates, and qualities of the listed contaminants shall not exceed the following limits specified in Table 3.1 below.

D. Test Reports: Prepare test reports showing the results and location of each test, a summary of the HVAC operating conditions, a listing of any discrepancies and recommendations for corrective actions, if required.

1. Include certification of test equipment calibration with each test report.

E. If any test fails the standard, the Contractor is responsible to ventilate the building with 100 percent outside air until the building passes both air quality tests and duct inspections. Retesting shall be performed at no additional expense to the Owner.

Table 3.1 MAXIMUM INDOOR AIR CONCENTRATION STANDARDS

INDOOR CONTAMINANTS	MAXIMUM AIR CONCENTRATION LEVELS*
Formaldehyde	50 parts per billion
Particulates (PM10)	50 micrograms per cubic meter
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
4-Phenylcyclohexene (4-PCH)**	6.5 micrograms per cubic meter
Carbon Monoxide (CO)	9 parts per million and no greater than 2 parts per million above outdoor levels

***** All levels must be achieved prior to acceptance of the building. The levels do not account for contributions from office furniture, occupants, and occupant activities.

****** This test is only required if carpet and fabrics with styrene-butadiene rubber (SBR) latex backing material are installed in the building.

F. Construction Indoor Air Quality (IAQ) Management Plan (During Construction) - Comply with SMACNA IAQ Guidelines for Occupied Buildings under Construction.

G. Construction Indoor Air Quality (IAQ) Management Plan (Before Construction) -

1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying 100% outside air or design minimum outdoor air rate continuously for five days while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60 percent.

2. If building occupancy is to occur before completion of the flush-out, deliver a minimum of 3500 cu ft of outdoor air per sq ft of floor area to the space. Once the space is occupied, ventilate it at a minimum rate of 0.30 cfm/sq ft of outside air or the design minimum outside air rate determined in accordance with Sections 4 through 7 of ASHRAE 62.1 or applicable local code, whichever is more stringent. During each day of the flush-out period, begin ventilation a minimum of three (3) hours prior to occupancy and continue during occupancy. Maintain these conditions until a total of 14000 cu ft/sq ft of outside air has been delivered to the space.

3. Engage an independent testing and inspecting agency to conduct a baseline IAQ testing program according to EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air.

3.2 INDEPENDENT MATERIALS TESTING

A. Materials That Must Be Tested: Test materials listed below that are proposed for use on this project for permanent, in-place Indoor Air Quality performance in accordance with requirements of these specifications. Results shall be furnished to the CT DOT Project Manager. Materials meeting the criteria for independent testing are as follows:

1. Field applied paint systems on appropriate substrate. Paint primers and intermediate coats (if used) should be applied with a typical drying time allowed between coats (not to exceed seven (7) days).

2. Carpet including manufacturer's recommended adhesive. The carpet will be applied to the appropriate concrete flooring per manufacturer's instructions so that the testing is of the "carpet assembly."

3. Acoustical ceiling tile.
4. Fireproofing material applied to appropriate substrate.

B. Materials for Testing: Only test representative samples of actual products selected for use on this project. Tests of products generically and/or technically similar but produced by a manufacturer other than that of the product selected for use on this project is invalid.

C. Materials Testing Parameters:

1. Wrap each material to be tested in air tight covering for shipment direct from the factory to the testing laboratory to avoid contamination in transit. Unwrap material or apply material to substrate if material is wet-applied, such as paint or adhesive materials) in the testing lab.
2. **Emissions Testing:** Perform all testing in accordance with ASTM D5116. Report results in accordance with Section ii of referenced ASTM Standard. Report in terms of emission rates at a minimum of three (3) distinct time intervals (e.g., one (1) hour, 24 hours, 72 hours) that will be modeled by the CT DOT Project Manager to predict maximum indoor air concentrations and to assist the Contractor in determining suitability of products or materials. Assumptions that will be used for the CT DOT Project Manager's model are given below for information.
3. Table 3.2 summarizes required product testing.

Table 3.2 PRODUCT EMISSION TESTING

PRODUCT ASSEMBLY TO BE TESTED	TVOC (per ASTM)	PM (per NIOSH)
Wall paint on appropriate substrate, including any primer coat	Yes	No
Carpet including adhesive and concrete flooring	Yes	No
Acoustical Ceiling Tile	No	Yes
Fireproofing material on appropriate substrate	No	Yes

D. Model Assumptions Used for Predicting Indoor Air Concentrations: The model will assume the standard room enclosure as 10' long x 10' wide x 9' high. Each product tested will be modeled separately to provide information on the particular product. The model will assume a ventilation rate of one (1) air change per hour.

1. **Field Applied Paint Systems:** Test fully cured samples of each complete paint system including primers, intermediate coats (if used), and finish coats. The model assumes application to all four (4) walls and one-half of ceiling of model standard room enclosure.
2. **Carpet and Adhesive Assembly:** Assumes application to entire 10 x 10 ft floor surface of model standard room enclosure.
3. **Acoustical Ceiling Tile:** Assumes application to entire 10 x 10 ft ceiling surface of model standard room enclosure.
4. **Fireproofing:** Assumes application to entire 10 x 10 ft area above the ceiling surface of model standard room enclosure.

E. Materials Test Reports: Submit test reports to the CT DOT Project Manager. The report shall include the information outlined in Section 11 of ASTM D5116.

F. **Product/Material Evaluation:** All products/materials shown by testing to comply with emissions limits and other criteria specified in this section will be approved for use on this project subject to compliance with all other specified requirements of the Project Manual. Products/materials shown by model to exceed specified emission limits shall be discussed, test results interpreted, and a determination made as to alternative product uses or selections.

END OF SECTION 01 45 23.13

SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including Division 00 Information and Contracting Requirements and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for identification badges, parking stickers, construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.

B. Temporary utilities include, but are not limited to, the following:

1. Temporary water service and distribution.

2. Temporary electric power and lighting services.

3. Temporary heating, cooling and ventilation

4. Temporary telephone service and data.

5. Temporary sanitary facilities, including drinking water.

6. Storm and sanitary sewer.

7. Storm water pollution control.

C. Support facilities include, but are not limited to, the following:

1. Field offices – Contractor, Trade contractors, Owner, and CT DOT Project Manager.
2. Storage and fabrication sheds.
3. Temporary roads and paving.
4. Dewatering facilities and drains.
5. Temporary enclosures.
6. Temporary lifts, hoists and elevator use.
7. Temporary project identification signs.
8. Temporary exterior lighting.
9. Collection and disposal of waste and cleaning.
10. Temporary Environmental Controls.
11. Stairs.

D. Security and protection facilities include, but are not limited to, the following:

1. Temporary fire protection.
2. Permanent fire protection.
3. Security for site and Agency.
4. Barricades, warning signs, and lights.
5. Enclosure fence.
6. Security enclosure and lockup.
7. Protection.

8. Environmental protection.

9. Traffic ways.

10. Identification badges for Contractor's personnel & parking stickers.

1.3 RELATED SECTIONS

A. Division 01 Section 01 31 00 Project Management and Coordination

B. Division 01 Section 01 57 30 "Indoor Environmental Control" for additional provisions governing temporary heating, ventilating and air conditioning.

1.4 SUBMITTALS

A. **Temporary Utilities:** Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. **Implementation and Termination Schedule:** Within twenty-one (21) days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

1.5 QUALITY ASSURANCE

A. **Regulations:** Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building and fire code requirements.

2. Health and safety regulations.

3. Utility company regulations.

4. Police, fire department, and rescue squad rules.

5. Environmental protection regulations.

6. Americans with Disabilities Act.

B. **Standards:** OSHA. Comply with NFPA 241 "Standard for Safeguarding Construction, Alteration, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA 200 "Recommended Practice for Installing and Maintaining Temporary Electric Power at Construction Sites."

1. **Electrical Service:** Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

C. **Inspections:** Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. **Temporary Utilities:** Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, the CT DOT Project Manager will direct the change over from use of temporary service to use of permanent service.

B. **Conditions of Use:** Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. **General:** Provide new materials. If acceptable to the Owner, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

B. **Lumber and Plywood:** Comply with requirements in Division 06 Section 06 10 00 "Rough Carpentry."

1. For signs and directory boards, provide 3/4-inch exterior grade, Grade A-B Fir plywood. Mount sign on preservative treated Fir posts.

a. Project sign shall be 4' x 8' painted and supported on 4-inch x 4-inch posts, of a design to be provided by the Owner via the CT DOT Project Manager.

2. **Vision Barriers:** Provide minimum 1/2-inch thick exterior plywood.

3. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch thick exterior plywood.

C. **Paint:** Comply with requirements of Division 09 Section 09 90 00 "Painting and Coatings."

1. For sign and directory boards applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer unless otherwise indicated.

D. **Tarpaulins:** Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

E. **Water:** Provide potable water approved by local health authorities.

F. **Enclosure Fencing:** Provide 0.120-inch thick, galvanized 2-inch chain link fabric fencing six (6) feet high galvanized steel pipe posts, 1-1/2 inches knuckle both bottom and top I.D. for line posts and 2-1/2 inches I.D. for corner posts.

2.2 EQUIPMENT

A. **General:** Provide new equipment. If acceptable to the Owner, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

1. The Contractor shall furnish tools, apparatus and appliances, hoists and/or cranes and power for same, scaffolding, runways, ladders, temporary supports and bracing and similar work or material necessary to insure convenience and safety in the execution of the Contract except where this is otherwise specified in any Specification Section. All such items shall meet the approval of the Owner but responsibility for design, strength and safety shall remain with the Contractor. All such items shall comply with Federal OSHA regulations and applicable codes, statutes, rules and regulations, including compliance with the requirements of the current edition of the "Manual of Accident Prevention in Construction" published by the Associated Contractors (AGC) and the standards of the State Labor Department.

2. Staging, exterior and interior, required for the execution of this Contract, shall be furnished, erected, relocated if necessary and removed by the Contractor. Staging shall be maintained in a safe condition without charge to and for the use of all trades as needed.

B. **Water Hoses:** Provide 3/4-inch, heavy-duty, abrasion-resistant, flexible rubber hoses with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge and backflow preventers.

C. **Electrical Outlets:** Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

D. **Electrical Power Cords:** Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

E. **Lamps and Light Fixtures:** Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

F. **Heating Units:** Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.

G. **Temporary Field Offices:** Provide prefabricated or mobile units with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.

H. **Temporary Toilet Units:** Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

I. **Fire Extinguishers:** Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 SUPPORT FACILITIES INSTALLATION

A. **General:** Locate field offices, storage sheds, and other temporary construction and support facilities in designated area as shown on the Contract Documents. The location of the trailers on the Drawings is diagrammatic in nature. Final placement of the trailers is to be approved by the CT DOT Project Manager.

1. Maintain support facilities until Final Completion. Remove prior to Final Completion with permission from the Owner.

2. CT DOT Project Manager's Field Offices / Equipment

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, this office shall be separated from any office occupied by the Contractor. Ownership and liability of the office quarters shall remain with the Contractor.

Materials: Materials shall be in like new condition for the purpose intended and shall be approved by the Engineer.

Office Requirements: The Contractor shall furnish the office quarters and equipment as described below.

Description:

500 Sq. Ft. of floor space with a minimum ceiling height of 7 ft. and shall be partitioned.

2 EA Minimum number of exterior entrances.

10 EA Minimum number of parking spaces.

Office layout: The office shall have a minimum square footage as indicated in the table above, and shall be partitioned. The underside of the office shall be fully skirted to the ground. Main entrance to have an 8 foot X 8 foot covered landing with stairs to grade on exterior.

Lavatory Facilities: The Contractor shall furnish a minimum of two (2) separate lavatories and toilet facilities ("men" and "women"), in separately enclosed rooms that are properly ventilated and comply with applicable sanitary codes. The Contractor shall provide each lavatory with hot and cold running water and flush-type toilets. He shall also supply lavatory and sanitary supplies as required. Domestic water to be tapped off an area fire hydrant and metered. The temporary water line is to be buried to prevent freezing. Waste is piped to a holding tank located outside the trailer resting on grade where it is to be accessible for emptying.

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 CTDOT PM:

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) steel security cross bars with keyed lock.

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 withdual NEMA 5-20 receptacles will be installed at each computer workstation location.

E. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed, for use by the Telephone Company.

F. Additional 120-volt circuits and duplex outlets as required meeting National Electric Code requirements.

G. One exterior (outside) wall mounted GFI receptacle, duplex, isolated ground, 120 volt, straight blade.

H. After work is complete and prior to energizing, the State's ConnDOT electrical inspector, must be contacted at 860-594-2240. (Do Not Call Local Town Officials)

I. Prior to field office removal the ConnDOT Data Communications office must be notified to deactivate the communications equipment.

Heating, Ventilation and Air Conditioning (HVAC): The field office shall be equipped with sufficient heating, air conditioning and ventilation equipment to maintain a temperature range of 68°-80° Fahrenheit within the field office.

The Following Furnishings and Equipment Shall Be Provided In The Applicable Field Office Type:

Qty	Description:
5 EA	Office desks (2.5 ft x 5 ft) with drawers, locks, and matching desk chairs that have pneumatic seat height adjustment and dual wheel casters on the base.
5 EA	Office Chairs.
2 EA	Fire resistant file cabinets (legal size/4 drawer), locking.
2 EA	Non-fire resistant file cabinets (legal size/4 drawer), locking.
1 EA	Storage racks to hold 3 ft x 5 ft display charts.
1 EA	Mail slot bin - legal size.
1 EA	Plan table (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.
3 EA	Personal computer tables (4 ft x 2.5 ft).
1 EA	Hot and cold water dispensing unit and supply of cups and bottled water shall be supplied by the Contractor for the duration of the project.
2 EA	Electronic office type printing calculators capable of addition, subtraction, multiplication and division with memory and a supply of printing paper.
5 EA	Telephone.
1 EA	Telephone answering machine.
1 EA	Plain paper facsimile (FAX) machine capable of transmitting via telephone credit card. All supplies, paper and maintenance shall be provided by the Contractor.

1 EA Copier/Scanner - dry, plain paper with automatic feeder and reducing capability. All supplies, paper and maintenance shall be provided by the Contractor.

4 EA Computer systems as specified below under Computer Hardware and Software. All supplies and maintenance shall be provided by the Contractor.

1 EA Laser printer as specified below under Computer Hardware and Software. All supplies, paper and maintenance shall be provided by the Contractor.

1 EA Digital Camera as specified below under Computer Hardware and Software. All supplies and maintenance shall be provided by the Contractor.

2 EA Wastebaskets - 30 gal., including plastic waste bags.

6 EA Wastebaskets - 5 gal., including plastic waste bags.

1 EA Electric pencil sharpeners.

* EA Fire extinguishers - provide and install type and number to meet applicable State and local codes for size of office indicated, including a fire extinguisher suitable for use on a computer terminal fire.

6 EA Interior partitions - 6 ft x 6 ft, soundproof type, portable and freestanding.

2 EA Vertical plan racks for 2 sets of 2 ft x 3 ft plans for each rack..

1 EA Double door supply cabinet with 4 shelves and a lock - 6 ft x 4 ft.

2 EA White boards 4’ X 6’

2 EA Open bookcases - 3 shelves - 3 ft long.

1 EA Cork display board 4’ X 4’

1 EA Conference Table

24 EA Conference Table Chairs

1 EA Infrared Thermometer, including certified calibration, case, cleaning wipes.

1 EA Concrete Curing Box as specified below under Concrete Testing Equipment.

1 EA Concrete Air Meter as specified below under Concrete Testing Equipment.

1 EA Concrete Slump Cone as specified below under Concrete Testing Equipment.

The furnishings and equipment required herein shall remain the property of the Contractor. Any supplies required to maintain or operate the above listed equipment or furnishings shall be provided by the Contractor for the duration of the project.

Telephone Service: This shall consist of two (2) telephone lines: one (1) line for phone/voice service and one (1) line dedicated for the facsimile machine. The Contractor shall pay all charges except for out-of-state toll calls made by State personnel.

Data Communications Facility Wiring: Contractor shall install a Category 5e 468B patch panel in a central wiring location and Cat 5e cable from the patch panel to each PC station, terminating in a (category 5e 468B) wall or surface mount data jack. The central wiring location shall also house either the data circuit with appropriate power requirements or a category 5 cable run to the location of the installed data circuit. The central wiring location will be determined by the ConnDOT Data Center staff in coordination with the designated field office personnel as soon as the facility is in place.

The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications, approved printer list and data wiring schematic as soon as possible after the contract is awarded.

Contractor to run a CAT 5e LAN cable a minimum length of 25 feet for each computer to LAN switch area leaving an additional 10 feet of cable length on each side with terminated RJ45 connectors. Each run / jack shall be clearly labeled with an identifying Jack Number. The installation of a data communication circuit between the field office and the ConnDOT Data Communication Center in Newington will be coordinated between the ConnDOT District staff, ConnDOT Office of Information Systems and the local phone company. The ConnDOT District staff will coordinate the installation of the data communication service with ConnDOT PC Support once the field office phone number is issued. The Contractor shall provide the field office telephone number(s) to the ConnDOT Project Engineer as soon as possible to facilitate data line and computer installations.

Computer Hardware and Software:

The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications, approved printer list and data wiring schematic as soon as possible after the contract is awarded.

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

Before any equipment is delivered to the Data Center, arrangements must be made a minimum of 24 hours in advance by contacting 860-594-3500. All software, hardware and licenses listed below shall be clearly labeled, specifying the (1) Project No., (2) Contractor Name, (3) Project Engineer's Name and (4) Project Engineer's Phone No., and shall be delivered to the ConnDOT Data Center, 2710 Berlin Turnpike, Newington, CT, where it will be configured and prepared for field installation. Installation will then be coordinated with ConnDOT field personnel and the computer system specified will be stationed in the Department's project field office.

The computer system furnished shall have all software and hardware necessary for the complete installation of the latest versions of the software listed, and therefore supplements the minimum specifications below. The CTDOT PM 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 CTDOT PM 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 CTDOT PM 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 10-29-14):

Processor – Intel® Core i7-4980HQ Processor (2.8 GHz, 1066 MHz FSB 6MB L2 Cache) to include Intel vPro™ Technology's Advanced Management Features

Memory – 8 GB DDR3L 1333,1600.

Monitor – Dual 24.0 inch LCD color monitor.

Graphics – PCIE video card capable of accepting two monitors. (Intel® Iris™ Pro Graphics 5200)

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 64 bit Service Pack 1.

Application Software – MS Office Professional Edition 2010.

Additional Software (Latest Releases, including subscription services for the life of the Contract) –

- Norton Anti-Virus,
- Blue-Beam Revu (Must be original purchased Licensed Media CD/DVD or authentic digital down load certificate).
- Adobe Acrobat Professional may be specified as an alternative to Blue-beam Revu, upon request by administrating District (Must be original purchased Licensed Media CD/DVD or authentic digital down load certificate).

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) Laser Printer – Minimum Specification:

Print speed – 20 ppm.

Resolution – 1,200 x 1,200 dpi. (with color capability)

Paper size – Up to 216 mm x 355 mm (8.5 in x 14 in).

RAM – 16 MB.

Print Drivers – Must support HP PCL6 and HP PCL5e.

Printer cable – 1.8 m (6 ft).

Network Ready

Note B1: Laser printer brands are limited to Hewlett-Packard and Savin brands only. The ConnDOT Project Engineer will provide the Contractor with a copy of the current PC specifications and approved printer list as soon as possible after the contract is awarded.

Note B2: It is acceptable to substitute (1) a high-speed multi-function all-in-one printer/copier/scanner/fax machines listed on the approved printer list in place of one required laser printer and fax machine, and (2) a multi-function all-in-one printer/copier/scanner/fax machine listed on the approved printer list in place of the second required laser printer and fax machine. Only one of these devices is required to be set-up to function as the one required fax machine.

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 AASHTO T 23.

B) Air Meter – The air meter provided shall be in good working order and will meet the requirements of AASHTO T 152.

C) Slump Cone Mold – Slump cone, base plate, and tamping rod shall be provided in like-new condition and meet the requirements of AASHTO T119, Standard Test Method for Slump of Hydraulic-Cement Concrete.

Insurance Policy: The Contractor shall provide a separate insurance policy, with no deductible, in the minimum amount of forty thousand dollars ($40,000.00) in order to insure all State-owned data equipment and supplies used in the office against all losses. The Contractor shall be named insured on that policy, and the Department shall be an additional named insured on the policy. These losses shall include, but not be limited to: theft, fire, and physical damage. The Department will be responsible for all maintenance costs of Department owned computer hardware. In the event of loss, the Contractor shall provide replacement equipment in accordance with current Department equipment specifications, within seven days of notice of the loss. If the Contractor is unable to provide the required replacement equipment within seven days, the Department may provide replacement equipment and deduct the cost of the equipment from monies due or which may become due the Contractor under the contract or under any other contract. The Contractor's financial liability under this paragraph shall be limited to the amount of the insurance coverage required by this paragraph. If the cost of equipment replacement required by this paragraph should exceed the required amount of the insurance coverage, the Department will reimburse the Contractor for replacement costs exceeding the amount of the required coverage.

Maintenance: During the occupancy by the Department, the Contractor shall maintain all facilities and furnishings provided under the above requirements, and shall maintain and keep the office quarters clean through the use of weekly professional cleaning to include, but not limited to, washing & waxing floors, cleaning restrooms, removal of trash, etc. Exterior areas shall be mowed and clean of debris. A trash receptacle (dumpster) with weekly pickup (trash removal) shall be provided. Snow removal, sanding and salting of all parking, walkway, and entrance ways areas shall be accomplished during a storm if on a workday during work hours, immediately after a storm and prior to the start of a workday. If snow removal, salting and

sanding are not completed by the specified time, the State will provide the service and all costs incurred will be deducted from the next payment estimate.

Storage and Fabrication Sheds: At Contractor's option install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.

Storage sheds for tools, materials and equipment shall be weathertight with heat, lighting and ventilation for products requiring controlled conditions.

Remove temporary materials, equipment services and construction before Substantial Completion.

Clean and repair damage caused by installation or use of temporary facilities. Restore existing facilities used during construction to specified or original condition.

B. **Dewatering Facilities and Drains:** For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 31 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.

C. **Temporary Enclosures**: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25-sq ft or less with plywood or similar materials.

3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.

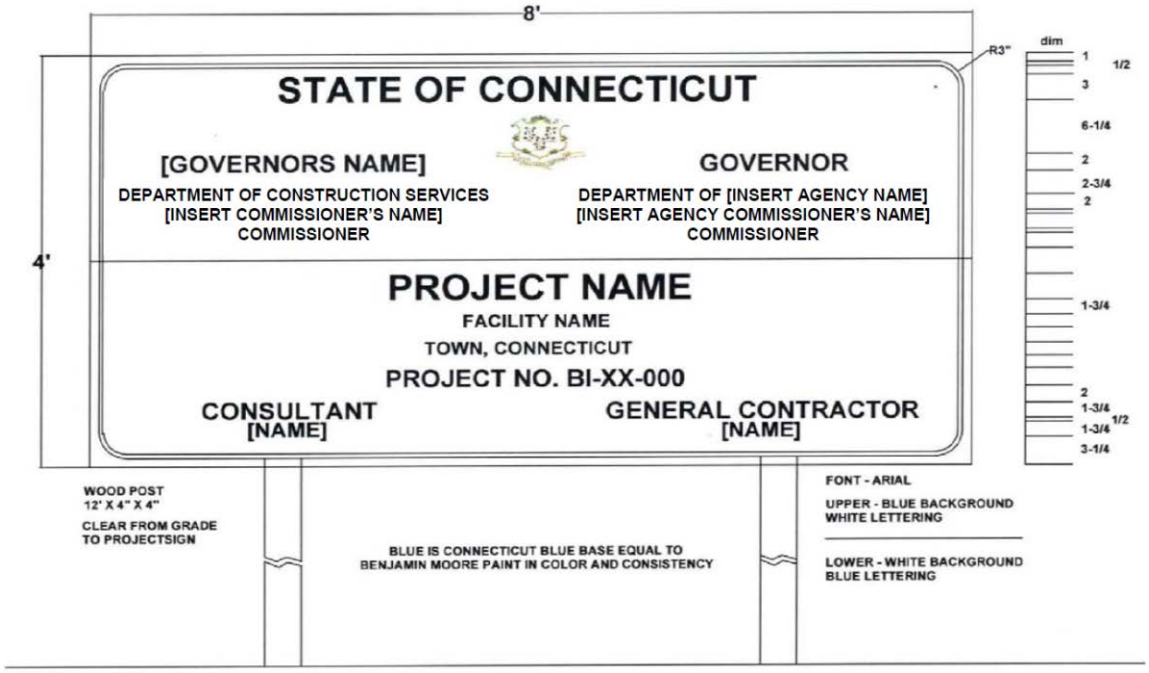
4. Where temporary enclosure exceeds 100-sq ft in area, use UL-labeled, fire-retardant-treated material for framing and main sheathing.

D. **Temporary Lifts, Hoists and Elevator Use:**

1. Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

2. Refer to Division 14 Section 14 20 10 for elevators.

E. **Temporary Project Identification Signs:** Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.



F. **Temporary Exterior Lighting:** Install exterior yard and sign lights so signs are visible when Work is being performed.

G. **Collection and Disposal of Waste and Cleaning:**

1. Collect waste within the contract limit line from construction areas daily. Provide separate containers for proper waste recycling. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80 degrees F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

2. Maintain areas under Contractor's control free of waste materials, debris and rubbish. Maintain in a clean and orderly condition.

3. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces before closing the space.

4. Periodically clean interior areas before start of surface finishing and continue cleaning on an as-needed basis.

5. Control cleaning operations so that dust and other particulates will not adhere to wet or newly coated surfaces.

H. **Temporary Environmental Controls:**

Contractor is to provide the following controls.

1. Rodent and Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be free of pests and their residues at materials.

2. Dust Control (construction and demolition).

3. Noise Control.

4. Erosion and Sediment Control.

5. Pollution Control.

6. Traffic Control.

I. **Stairs:** Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. **Security for Site and Agency:**

1. Provide security program and facilities to protect work, existing facilities and the Owner and Agency's operations from unauthorized entry, vandalism and theft. Coordinate with the Owner's and Agency's security program.

2. The Contractor shall be solely responsible for damage, loss or liability due to theft or vandalism.

B. **Barricades, Warning Signs, and Lights:** Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

1. Provide covered walkways as required by governing authorities for public rights-of-way and for public access to existing buildings.

2. Provide temporary, insulated, weathertight closures at openings to the exterior to provide acceptable working conditions and protection for materials, to allow for temporary heating and to prevent entry of unauthorized persons. Provide doors with self-closing hardware and locks.

3. Barriers and enclosures shall be in conformance with code requirements. Do not block egress from occupied buildings unless necessary to further the work of the Contract. In this case, secure the Owners approval of an alternate egress plan.

C. **Enclosure Fences:** Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated on the Construction Documents, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.

1. Provide chain link construction fencing with posts set in a compacted mixture of gravel and earth. Use existing fence to the extent possible.

D. **Security Enclosure and Lockup:** Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Provide keys to the CT DOT Project Manager.

1. **Storage:** Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

E. **Protection:**

1. Protect buildings, equipment, furnishings, grounds and plantings from damage. Any damage shall be repaired or otherwise made good at no expense to the Owner.

2. Provide protective coverings and barricades to prevent damage. The Contractor shall be held responsible for, and must make good at his own expense, any water or other

type of damage due to improper coverings. Protect the public and building personnel from injury.

3. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

4. Provide protective coverings for walls, projections, jambs, sills and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects and storage. Prohibit traffic and storage on waterproofed and roofed surfaces and on lawn and landscaped areas..

F. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result.

G. Traffic Ways:

1. The Contractor may use on-site paved roads and parking areas but shall not encumber same or their access. Public highways shall not be blocked by standing trucks, parked cars, material storage, construction operations or in any other manner.

2. Public roads and existing paved roads, drives and parking areas on Owner's property shall be kept free from scrap or debris due to construction operations and any damage to their surface caused by the Contractor shall be repaired by him at his own expense.

3. If the work of the Contract affects public use of any street, road, highway or thoroughfare, the Contractor shall confer with the police authority having jurisdiction to determine if and how many police are needed for public safety in addition to any barriers and signals that may be needed. The Contractor will be responsible for payment of any needed police services.

H. Identification Badges for Contractor's Personnel, Visitors & Parking Stickers:

1. The Contractor will provide each person working or visiting at the site with an identification badge, bearing the name of the Contractor and a number. As badges are assigned, a record shall be kept by the Contractor and given to the CT DOT Project Manager and Agency Administrator. Update and correct the records of all badges issued on a semi-monthly basis.

2. Badges are to be worn on outer garment where visible at all times while at the construction site, return them to the Contractor’s field office at the end of each day and pick them up there each morning.

3. All vehicles parking in the Contractor's parking lot and those used around the site require an ID sticker. They will be issued by the Contractor Agency. The Contractor is to maintain a record of ID’s to be provided to the CTDOT.

END OF SECTION 01 50 00

SECTION 01 51 33 – TEMPORARY TELECOMMUNICATIONS

PART 1 –GENERAL

1.1 SECTION INCLUDES

A. Description: the Contractor shall provide communication equipment for use by the inspection personnel. This item shall include all necessary equipment, accessories, material and labor to put the system into operation. Provisions shall also be made to maintain all provided communication equipment and any additional communication equipment assigned to the project, as directed by the CTDOT PM.

B. A toll-free, reservation-less telephone conference call account for the use of the CTDOT PM.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The equipment for this item shall conform to the following: A hand held cellular phone capable of communicating digitally between units with two-way radio feature. This item shall include all necessary equipment, accessories (including but not limited to car charger and holster), materials, labor and maintenance to make the system operational. In addition, the phones shall have voice mail, caller ID and call waiting.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

A. Communication Equipment: The Contractor shall submit three (3) proposals for both the communication equipment described herein and forward to the CTDOT PM for approval. The Department will provide the Contractor with the estimated quantity of phones required for inspection personnel.

The three proposals may be for either rental or purchase of equipment that is new or of like-new condition and meeting the specification requirements. Also, the three proposals must indicate the minimum and maximum number of phones that will be allotted. The CTDOT PM will have ten (10) days from receipt of the proposals to inform the Contractor of its selection. Once approved, the contractor shall order the equipment, and have it installed and operating within fifteen (15) working days.

The Contractor will furnish to the State, a copy of the monthly call record for each phone when submitting the billing invoices for the communication equipment.

All equipment and associated materials will remain the property of the Contractor upon completion of the project unless otherwise specified by the CTDOT PM in writing.

B. Telephone Conference Call Account: The Contractor shall submit three (3) proposals for the telephone conference call account described herein and forward to the CTDOT PM for approval.

The CTDOT PM will have ten (10) days from receipt of the proposals to inform the Contractor of its selection. Once approved, the contractor shall activate the account within five (5) working days.

Once activated, the CTDOT PM will act as the "moderator" and control all associated PIN numbers.

The Contractor will furnish to the State, a copy of the detailed monthly account history when submitting the billing invoices for the telephone conference call account.

END OF SECTION 01 51 33

SECTION 01 51 39 – TEMPORARY SUPPORT OF UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: Work under this item shall consist of designing, furnishing, placing and subsequently removing temporary sheet piling supports and protection shields which will be necessary to protect and/or stabilize the existing utilities during construction.

B. The work pertaining to the temporary support of utility pipes/facilities (including sanitary sewers and force mains, electrical and existing drainage facilities to remain in service) primarily involves the support and prevention of damages which are possible during the excavation and construction of the proposed facilities as shown on the plans.

C. The Contractor is advised that no service interruption resulting from his operations will be allowed, except as otherwise provided for in the Section 01 11 00 "Summary of Work". Extreme caution shall be exercised during all stages of construction in order to preserve the existing utilities. A Department representative shall be present at the installation of the temporary supports. Further attention shall be paid to the Notice to Contractor "Protection of Existing Utilities, Section 01 35 13 Special Project Procedures".

D. The Contractor shall notify the CT DOT Project Manager prior to the start of his work and shall be responsible for all coordination with the Department. The Contractor shall allow the CT DOT Project Manager complete access to the work.

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. The materials for this work shall be of satisfactory quality for the purpose intended and shall be approved by the CT DOT Project Manager. The material shall be intended for use in structures and shall be sound and capable of safely carrying the specified loads.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall prepare Working Drawings and computations showing his proposed method of support and protection for each utility to be supported and protected. Preparation of Working Drawings and computations shall conform to the requirements of Section 01 33 00 Submittal Procedures and Section 01 33 00.13 Document Control. The support shall safely carry all utility dead loads and any imposed loadings under all possible construction conditions. The utility protection shields shall safely carry any imposed loadings under all possible construction conditions. Said supports and protections shall be constructed in a

manner that will not interfere with the removal of existing drainage pipes or structure or proposed drainage system installation.

B. The design shall be submitted to the CT DOT Project Manager for review and approval. The design shall be submitted at least three (3) weeks prior to the beginning of construction. No work will be allowed in the vicinity of any utility until the Contractor receives approval of his support method from the utility representative and the CT DOT Project Manager.

C. The Contractor shall use every effort to protect all utilities from damage of any nature that might result from carelessness or negligence in his operations. He shall be held solely and strictly responsible for any damage resulting from such carelessness and negligence.

D. A periodic inspection of the temporary utility support and protection shall be performed by the Contractor, as directed by the CTDOT PM.

E. The Contractor shall support and maintain the existing utilities until such time as the new drainage system has been installed and all trenches backfilled to finished grade above the utilities.

F. When the temporary utility support and protection systems are no longer required, they shall be removed from the site by the Contractor.

END OF SECTION 01 51 39

SECTION 01 55 26 – TRAFFIC CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Unless other provisions are made on the plans or in the contract specifications, the Contractor shall keep the roadways under construction open to traffic for the full length of the project and shall provide a sufficient number of travel lanes and pedestrian passways to move that traffic ordinarily using the roadways. The travel lanes and pedestrian passways shall be drained and kept reasonably smooth and in suitable condition at all times in order to provide minimum interference to traffic consistent with the proper prosecution of the work.

B. Suitable ingress and egress shall be provided at all times where required, for all intersecting roads and for all abutting properties having legal access. This shall include but not limited to Ikea, New Haven Food Terminal, properties on Church Street Ext., United States Postal Service (USPS), and the New Haven Rail Yard (NHRY).

C. When a scheme for maintenance of traffic, which may include detours, is shown on the plans or in the contract specifications, this shall govern unless an alternate scheme acceptable to the CTDOT PM is offered by the Contractor at no additional cost. If no scheme is shown on the plans or described in the contract specifications, and the Contractor wishes to deviate from the provisions of maintaining traffic as described in this section, the Contractor may submit and the CTDOT PM may approve a schedule showing a proposed sequence of operations and a compatible method of maintaining traffic.

D. The Contractor shall maintain and protect traffic for the relocation of Brewery Street as noted in this Section.

E. At no time, unless otherwise approved by the CTDOT PM, shall the Contractor close or cause to be closed any portion of roadways beyond what is stipulated herein, or on the plans, as necessary to perform the work. The Contractor's work operations shall be performed in the protected construction zones as shown on the Construction Traffic Control Plans and shall not encroach upon, nor be performed from the maintained vehicular travel paths.

F. Due to the nature of traffic and the relocation of Brewery Street, appropriate signage will be required on Brewery Street to warn vehicles of the work on Long Wharf Street. A plan for the installation of Brewery Street signs must be submitted to the CTDOT PM for approval in advance of the work.

G. Outside the rail yard fencing, all open excavations shall be covered with steel plates during non-working hours. Steel plates shall be of a thickness to accommodate an AASHTO HS-20 vehicle loading when spanning the full width of the excavation.

H. Outside the rail yard fencing, the Contractor shall use precast concrete barriers to separate open excavations from travel lanes. Where precast concrete barrier curb is installed for the protection of traffic from a work area, the terminal end shall be protected by a Sand Inertial Barrier or Impact Attenuator if directed so by the CTDOT PM.

I. Work on adjacent Department projects may be going on at the same time as this project. Coordination between Department projects is mandatory so that proper traffic flow can be maintained at all times.

J. The Contractor shall provide suitable lighted barriers or barricades erected and maintained at all times, around open trenches or excavations, or other work potentially dangerous to pedestrians and vehicular traffic.

K. Should the Contractor or the Contractor's employees neglect to place and maintain barricades or lights, as required, the CTDOT PM immediately, and without notice, may furnish, install and maintain barricades or lights. The cost thereof shall be borne by the Contractor and may be deducted from any amount due to become due to the Contractor under this Contract.

L. The extension of the Rail Yard driveway will affect the main yard entrance roadway off of Brewery Street and the yard entrance must remain open. The Contractor must schedule this work four weeks in advance with the CTDOT PM and provide a plan indicating signage, barricades, street plates and other measures necessary to ensure the continuity of vehicular traffic in and out of the yard.

M. The Relocation of Brewery Street, reconstruction of Brewery Street and Long Wharf Street intersection will affect the main yard entrance roadway off of Long Warf Street and the yard entrance must remain open. The Contractor must schedule this work four weeks in advance with the CTDOT PM and provide a plan indicating signage, barricades, street plates and other measures necessary to ensure the continuity of vehicular traffic in and out of the yard.

N. At no time will more than one of the three lanes through the Guard Booth area be removed from service unless written approval from the CTDOT PM has been obtained. The Contractor shall schedule the installation of drainage, curbing and paving in a manner such that the overall duration of work affecting the yard entrance is kept to the absolute minimum. The turning radius of trucks entering and leaving the yard must be accounted for when developing the staging plans for the installation of these site features.

O. The Contractor shall stage and schedule this work so that the operation of the Guard Booth is not compromised. In addition, the secure perimeter of the yard must be maintained throughout this and all construction work.

P. For the relocation of Brewery Street, access to all private driveways shall be maintained. It is anticipated that the majority of relocated Brewery Street will be constructed at once and the new roadway will be tied into the existing at either end to maintain traffic. A minimum of alternating one-way traffic on Brewery Street and relocated Brewery Street shall be maintained at all times.

Q. The Contractor shall furnish all reflectorized orange traffic cones required on the project to conform to the requirements as stated in the specification for Traffic Control, as shown on the traffic control plans within this specification and as directed by the CTDOT PM. The Contractor shall have, available on the project, a sufficient number of traffic cones to fulfill all the requirements as specified in the contract and to replace those traffic cones which have become damaged.

R. The Contractor shall furnish all traffic drums required on the project to conform to the traffic patterns, as indicated on the traffic control plans within this specification and as directed by the CTDOT PM.

S. The Contractor shall furnish construction barricades to conform to the requirements of NCHRP Report 350 (TL-3) and to the requirements stated in the specification for Traffic Control as shown on the plans and/or as directed by the CTDOT PM.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Traffic cones shall be constructed of materials to a thickness to withstand impact without damage to cones or to vehicles. The traffic cones shall be of sufficient mass or have bases to which ballast may be added to assure that they will not be blown over or displaced by wind from passing vehicles. Traffic cones used at night shall be reflectorized by utilizing Type VI Retroreflective Sheeting, in accordance with Section 10 14 53 Traffic Signage.

B. Traffic Drums shall be manufactured plastic or rubber devices designed in accordance with the latest edition of the MUTCD. The design of the device will allow for the installation of barricade warning lights. The device shall be stabilized with the use of sandbags or other approved means.

The traffic drum shall have, as a minimum, two 4-inch wide retroreflective orange stripes and two 6-inch wide retroreflective white stripes. The stripes shall be placed horizontally and alternated with the orange stripe on top. The alternated stripes should not touch. The sections of the traffic drum not covered with retroreflective sheeting shall be orange.

Either Type III or Type VI Retroreflective Sheeting, in accordance with Section 10 14 53 Traffic Signage, shall be used on traffic drums. Only one type sheeting shall be used on a drum and all drums furnished on a construction project shall be manufactured with the same type retroreflective sheeting. Retroreflective sheeting shall conform to the requirements of Section 10 14 53 Traffic Signage. For this material, a Materials Certificate shall be required.

C. Construction Barricades: Prior to using the construction barricades, the Contractor shall submit to the CTDOT PM 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 Section 10 14 53 Traffic Signage.

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 CTDOT PM before they are used.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. The Contractor shall furnish and erect signs legally closing the highway to traffic, as shown on the plans or directed by the CTDOT PM, prior to commencing any work on the Project.

B. The Contractor shall furnish a sufficient number of signs, barricades, drums, traffic cones and delineators to forewarn traffic of the construction as shown on the traffic control plans contained within or as directed by the CTDOT PM.

C. The Contractor shall also provide such safety measures, pavement markings, warning devices and signs as deemed necessary to safeguard and guide the traveling public through detours ordered by the CTDOT PM, included in the approved scheme for maintenance of traffic, or as shown on the plans. The Contractor shall erect, maintain, move, adjust, clean, relocate and store these signs, barricades, drums, traffic cones and delineators when, where and as directed by the CTDOT PM, and in accordance with the ATSSA guidelines contained in "Quality Standards for Work Zone Traffic Control Devices."

D. The use of unauthorized or unapproved signs, barricades, drums, traffic cones or delineators will not be permitted.

E. All signs in any one signing pattern shall be mounted the same height above the traveled surface. The Contractor shall keep all signs in proper position, clean and legible at all times. Care shall be taken so that weeds, shrubbery, construction materials or equipment, and soil, are not allowed to obscure any sign, light, or barricade. Signs that do not apply to existing conditions shall be removed or adjusted so that the legend is not visible to approaching traffic.

F. The Contractor, when ordered by the CTDOT PM, shall remove snow and take care of icy conditions on temporary, new and existing sidewalks on any part of the right-of-way within the limits of the project. Payment for the cost thereof, will be made as extra work.

G. Snow removal and correction of icy conditions, other than those resulting from the Contractor's operations, on uncompleted contracts under traffic, will remain an obligation of the State or others.

H. Should the Contractor fail to perform any of the work required under this section, the State may perform or arrange for others to perform such work. In such cases, the State will deduct from money due or to become due the Contractor all expenses connected there with which are found to be greater than the cost to the State had the Contractor performed the specified work.

I. The Contractor shall have, available on the project, a sufficient number of traffic drums to fulfill all the requirements, as specified in the contract, to provide adequate traffic control during periods of unforeseen circumstances or emergencies.

J. Traffic drums shall be designed and installed in accordance with the plans, the MUTCD latest edition, and as directed by the CTDOT PM.

K. Any traffic drum that is missing, damaged or defaced so that it is not effective, as determined by the CTDOT PM and in accordance with the ATSSA guidelines contained in "Quality Standards for Work Zone Traffic Control Devices," shall be replaced by the Contractor.

L. When the traffic drums are no longer required on the project, they shall remain the property of the Contractor.

M. Ineffective barricades, as determined by the CTDOT PM 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.

N. Barricades that are no longer required shall be removed from the project and shall remain the property of the Contractor.

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. A CHANGEABLE MESSAGE SIGN MAY BE UTILIZED ONE HALF TO ONE MILE IN ADVANCE OF THE LANE CLOSURE TAPER.

5. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 72 HOURS, THEN TRAFFIC DRUMS SHALL BE USED IN PLACE OF TRAFFIC CONES.

6. ANY LEGAL SPEED LIMIT SIGNS WITHIN THE LIMITS OF A ROADWAY / LANE CLOSURE AREA WILL BE COVERED WITH AN OPAQUE MATERIAL WHILE THE CLOSURE IS IN EFFECT AND UNCOVERED WHEN THE ROADWAY / LANE CLOSURE IS REOPENED TO ALL LANES OF TRAFFIC.

7. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 36 HOURS, THEN THE EXISTING CONFLICTING PAVEMENT MARKINGS SHALL BE ERADICATED OR COVERED AND TEMPORARY PAVEMENT MARKINGS THAT DEPICT THE PROPER TRAVELPATHS SHALL BE INSTALLED.

8. DISTANCES BETWEEN SIGNS IN THE ADVANCE WARNING AREA MAY BE REDUCED TO 200' ON LOW SPEED URBAN ROADS (SPEED LIMIT < 40 MPH).

9. FOR LANE CLOSURES ONE (1) MILE OR LONGER, A "REDUCE SPEED TO 45 MPH" SIGN SHALL BE PLACED AT THE ONE MILE POINT AND AT EACH MILE THEREAFTER.

10. 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.

11. A CHANGEABLE MESSAGE SIGN SHALL BE INSTALLED ONE HALF TO ONE MILE IN ADVANCE OF THE LANE CLOSURE TAPER.

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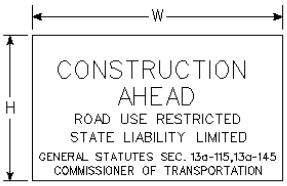
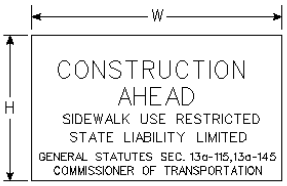
CONSTRUCTION
TRAFFIC CONTROL PLAN
NOTES

NOTES.DGN

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"

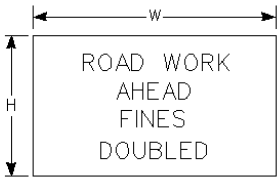
THE 16-S SIGN SHALL BE USED ON ALL PROJECTS THAT REQUIRE SIDEWALK RECONSTRUCTION OR RESTRICT PEDESTRIAN TRAVEL ON AN EXISTING SIDEWALK.

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"

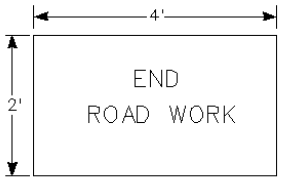
THE REGULATORY SIGN "ROAD WORK AHEAD, FINES DOUBLED" SHALL BE INSTALLED FOR ALL WORK ZONES THAT OCCUR ON ANY STATE HIGHWAY IN CONNECTICUT WHEN THERE ARE WORKERS ON THE HIGHWAY OR WHEN THERE IS OTHER THAN EXISTING TRAFFIC OPERATIONS.
THE "ROAD WORK AHEAD, FINES DOUBLED" REGULATORY SIGNS SHALL NOT BE INSTALLED ON TOWN ROADS.
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.



	W H
31-1906	48" x 42"

"END ROAD WORK" SIGN

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



80-9612

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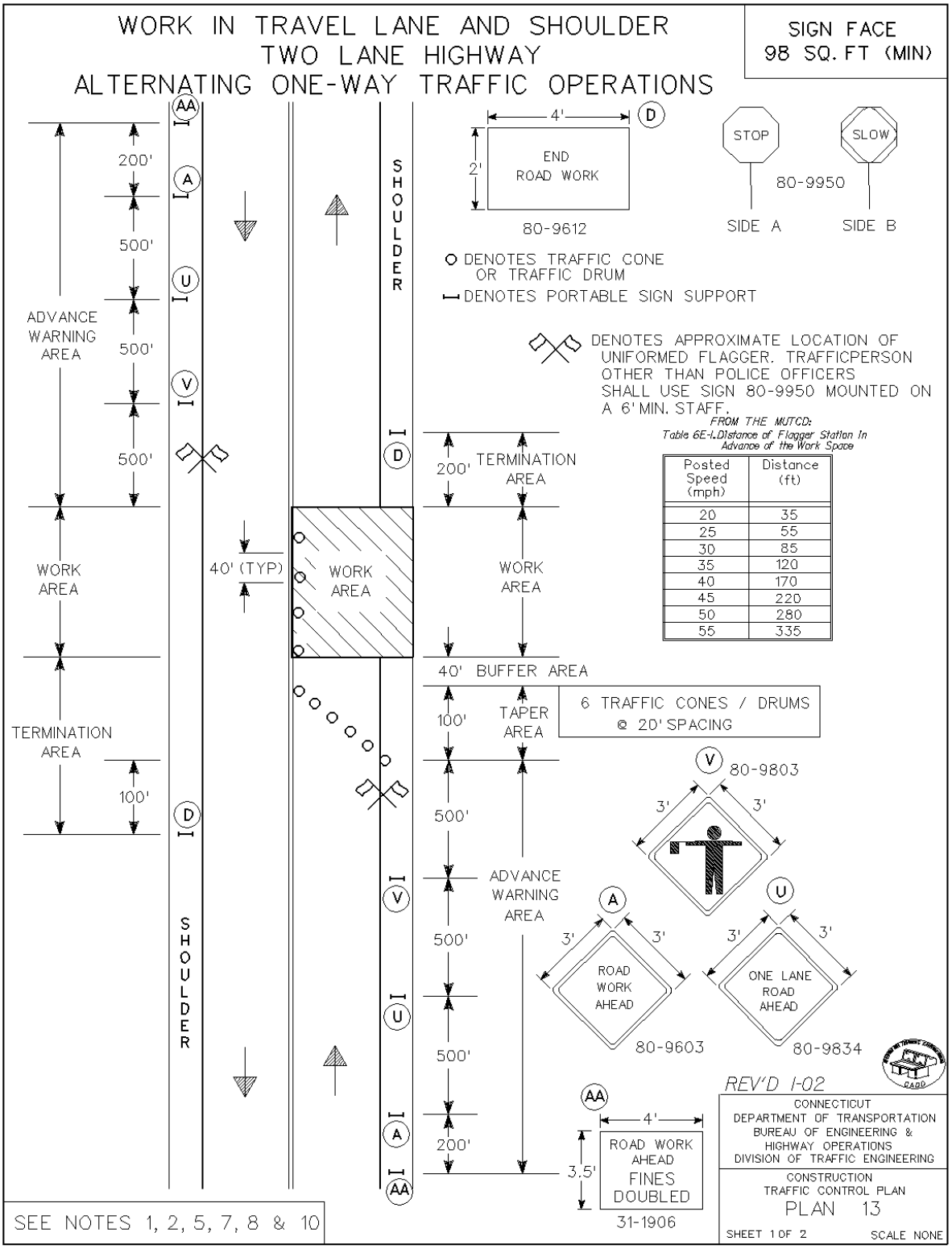
DIVISION OF TRAFFIC ENGINEERING

CONSTRUCTION
TRAFFIC CONTROL PLAN

REQUIRED SIGNS

APPROVED J.Carey PRINCIPAL ENGINEER DATE 1-02


WORK IN TRAVEL LANE AND SHOULDER
TWO LANE HIGHWAY
ALTERNATING ONE-WAY TRAFFIC OPERATIONS
SIGN FACE
98 SQ. FT (MIN)
4'
2'
END
ROAD WORK
80-9612
STOP
SLOW
80-9950
SIDE A
SIDE B
DENOTES TRAFFIC CONE OR TRAFFIC DRUM
DENOTES PORTABLE SIGN SUPPORT
DENOTES APPROXIMATE LOCATION OF UNIFORMED FLAGGER. TRAFFICPERSON OTHER THAN POLICE OFFICERS SHALL USE SIGN 80-9950 MOUNTED ON A 6' MIN. STAFF.
FROM THE MUTCD:
Table 6E-1.Distance of Flagger Station In Advance of the Work Space
Posted Speed (mph) | Distance (ft)
20 | 35
25 | 55
30 | 85
35 | 120
40 | 170
45 | 220
50 | 280
55 | 335
ADVANCE WARNING AREA
200'
500'
500'
500'
WORK AREA
TERMINATION AREA
100'
SHOULDER
40' (TYP)
WORK AREA
200'
TERMINATION AREA
WORK AREA
40' BUFFER AREA
100'
TAPER AREA
6 TRAFFIC CONES / DRUMS @ 20' SPACING
500'
ADVANCE WARNING AREA
500'
500'
200'
80-9803
3'
3'
ROAD WORK AHEAD
80-9603
ONE LANE ROAD AHEAD
80-9834
REV'D 1-02
4'
3.5'
ROAD WORK AHEAD
FINES DOUBLED
31-1906
CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & HIGHWAY OPERATIONS
DIVISION OF TRAFFIC ENGINEERING
CONSTRUCTION
TRAFFIC CONTROL PLAN
PLAN 13
SHEET 1 OF 2
SCALE NONE
SEE NOTES 1, 2, 5, 7, 8 & 10
APPROVED J.Carey
PRINCIPAL ENGINEER
DATE 1-02

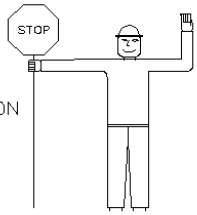
WORK IN TRAVEL LANE AND SHOULDER
TWO LANE HIGHWAY
ALTERNATING ONE-WAY TRAFFIC OPERATIONS

HAND SIGNAL METHODS TO BE USED BY UNIFORMED FLAGGERS

THE FOLLOWING METHODS FROM SECTION 6E.04 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 TYPICAL DETAIL SHEET ENTITLED "SIGNS FOR CONSTRUCTION AND PERMIT OPERATIONS" SHALL BE USED.

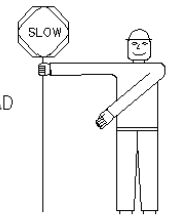
A. TO STOP TRAFFIC

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.



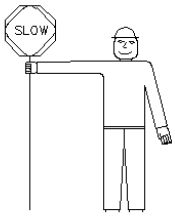
B. TO DIRECT TRAFFIC TO PROCEED

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.



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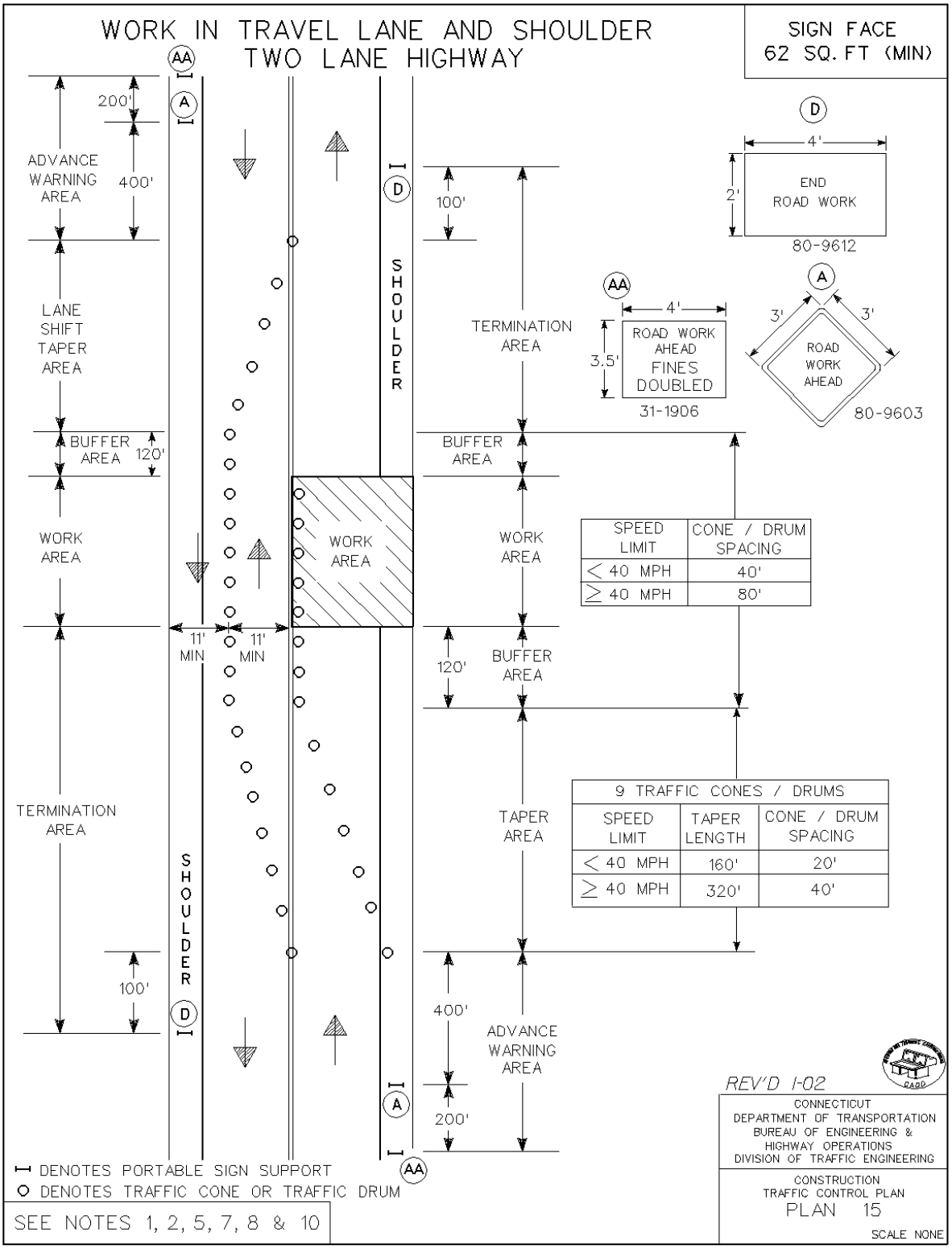
CONSTRUCTION
TRAFFIC CONTROL PLAN
PLAN 13

SHEET 2 OF 2 SCALE NONE

SEE NOTES 1, 2, 5, 7, 8 & 10

APPROVED J. Carey PRINCIPAL ENGINEER DATE 1-02



END OF SECTION 01 55 26

SECTION 01 55 26.13 – TRAFFICPERSON

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. 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.

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.

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.

B. Trafficpersons shall consist of the following types:

1. State Police Officers: State Police Officers shall be uniformed off-duty sworn Connecticut State Police Officers. Their services will also include the use of official State Police vehicles and associated equipment.

   State Police Officers will be used on all limited access highways. State Police Officers will not be used on non limited access highways unless specifically authorized in writing by the Engineer. State Police Officers with official State 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. On limited access highways, the Engineer may determine that State Police Trafficpersons will be utilized for regional work zone traffic safety and enforcement operations in addition to project-related work zone assignments.

2. Uniformed 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 all 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.

3. Uniformed Flagger: Uniformed Flaggers shall be persons who have successfully completed flagger training by the ATSSA, National Safety Council 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. Services of Uniformed Flaggers will only be used on non limited access highways when authorized in writing by the Engineer. Uniformed Flaggers will be used at such locations and for such periods as the Engineer deems necessary to control traffic operations.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Services of Uniformed Flaggers shall include the following equipment: garments (including high visibility headgear) so as to be readily distinguishable as a Flagger in accordance with Standard 6E-2 of the MUTCD, and these specifications, and a STOP/SLOW paddle that is at least 18 inches in width with letters at least 6 inches high, mounted on a handle of sufficient length so that the bottom of the sign will be 6 feet above the ground, and conforms to Standard 6E-3 of the MUTCD and catalog number 387-80-9950 of the Catalog of Signs ConnDOT.

PART 3 – EXECUTION

3.1 GENERAL

A. Prior to the start of operations on the project requiring the use of Trafficpersons, a meeting will be held with the contractor, traffic 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 the start of work.

B. Uniformed Law Enforcement Personnel being used as Trafficpersons may conduct motor vehicle enforcement operations in and around work areas as directed and approved by the Engineer.

Trafficpersons shall wear a high visibility safety garment that complies with OSHA, MUTCD, ASTM Standards and the following:

C. Uniformed 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 below for the Uniformed Flaggers' garment.

D. Uniformed Flagger: The base material for the safety garment shall be a fluorescent color of orange, yellow, or strong yellow-green. The garment shall have vertical and horizontal stripe markings of contrasting color to the base material to enhance noticeability of the wearer.

These markings shall be made of retroreflective or combination of retroreflective and non-retroreflective materials. The retroreflective material shall be orange, yellow, white, silver, strong yellow-green or a fluorescent version of one of these colors and shall have a minimum width of 5/8 inch. A minimum area of 40 square inches of retroreflective material must be visible when the garment is viewed from either the front or back and a minimum area of 12 square inches of retroreflective material must be visible from any other normal observation angle. The safety garment shall have the words "Traffic Control" clearly visible on the front and rear panels (minimum letter size 2 inches). 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 additional cost to the State.

E. A Trafficperson shall assist in implementing the traffic control specified in the Traffic Control Section of these specifications or as directed by the Engineer. Any situation requiring a Trafficperson to operate in a manner contrary to the Traffic Control section shall be authorized in writing by the Engineer.

F. Prior to the start of operations on the project requiring the use of Trafficpersons, a meeting will be held with the Contractor, Trafficperson agency, and Engineer to review the Trafficperson operations, lines of responsibility, and operating guidelines which will be used on the project.

G. In the event of an unplanned, emergency, or short term operation, the Engineer may approve the use of properly clothed, non-certified Trafficpersons until such time as a certified Trafficperson may be obtained. In no case shall this temporary use exceed 8 hours for any particular operation

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

END OF SECTION 01 55 26.13

SECTION 01 57 13 – TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Measures to control water pollution and soil erosion through the use of berms, dikes, dams, sediment basins, erosion control matting, gravel, mulches, grasses, slope drains, ditches, channels, riprap, grading to control surface runoff and other erosion control devices or methods.

If the Contractor proposes changes in construction or his scheduling which would affect the designed pollution controls, he shall submit plans before starting construction for revised pollution controls for the approval of the CTDOT PM.

1. Sedimentation Control Systems: This work shall consist of furnishing, placing, maintaining and removing sedimentation control systems as shown on the plans or as directed by the CTDOT PM. Maintaining shall include the clean out of accumulated sediment.

2. Sedimentation Control Bales: This work shall consist of furnishing, placing, maintaining and removing hay bales for sedimentation control as shown on the plans or as directed by the CTDOT PM. Maintaining shall include the clean-out of accumulated sediment.

3. Anti-tracking Pad: The Contractor shall be responsible for installing and maintaining anti-tracking pads at locations indicated on the Contract Drawings or other locations as directed by the CTDOT PM. It shall also include the removal of the Anti-Tracking Pad when the work is complete. Each Anti-Tracking Pad shall consist of crushed stone placed to the limits and for the depth shown on the plans or described herein onto filter fabric, or as directed by the CTDOT PM.

4. Sediment Control System at Catch Basin: This work shall consist of furnishing, placing, maintaining and removing sedimentation control systems at Catch Basins as shown on the plans or as directed by the CTDOT PM. Maintaining shall include the clean out of accumulated sediment.

1.2 SUBMITTALS

A. See Section 01 33 00 Submittal Procedures and Section 01 33 00.13 Document Control for submittal requirements for this work.

B. The Contractor shall submit a plan showing erosion and sedimentation controls above and beyond those called for in the plans and/or specifications, necessitated by the proposed sequence of operations and/or construction activities. The construction shall not proceed until the erosion and sedimentation control plans have been approved by the CTDOT PM. The CTDOT PM may order additional control measures if the measures mentioned above prove insufficient.

1.3 RELATED REQUIREMENTS

A. Section 31 23 16 Excavation.

B. Section 31 23 23 Fill.

C. Section 32 91 19.13 Topsoil Placement and Grading.

D. Section 32 92 19 Seeding.

PART 2 PRODUCTS

2.1 - MATERIALS

A. The materials for this work shall conform to the following requirements:

1. Hay bales shall be made of hay with 40 pounds minimum weight and 120 pounds maximum weight. Wood stakes shall be a minimum of 1 inch x 1 inch nominal size by a minimum of 3 feet long.

2. Geotextiles: Geotextiles 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 CTDOT PM 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 which are susceptible to damage from sunlight or heat shall be so identified by suitable warning information on the packaging material.

3. 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 CTDOT PM. Materials incidental to and necessary for the installation of the geotextile, such as, but not limited to sewing thread, staples, pins, etc., shall conform to the requirements of the manufacturer of the geotextile

4. Crushed stone shall conform to the requirements of Section 31 23 23 for 2 inch (No. 3) coarse aggregate.

5. Slope drains or ditches may be constructed of pipe, rubble, riprap, sod, burlap, plastic sheets, portland cement concrete, bituminous concrete, or other material approved by the CTDOT PM.

6. Seeding shall conform to Section 32 92 19 Seeding.

7. Sediment Control System at Catch Basin: Sediment Control System at Catch Basin shall be Siltsack® manufactured by Terrafix Geosynthetics Inc. or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that construction area for sedimentation control systems as indicated on the plans and ready for the Work as indicated.

3.2 PREPARATION

A. Layout the location indicated on the plans for sedimentation control systems prior to construction.

3.3 CONSTRUCTION

A. The CTDOT PM has the authority to control the surface area of earth material exposed by construction operations and to direct the Contractor to immediately provide permanent or temporary pollution control measured to prevent contamination of adjacent streams, watercourses, lakes, ponds or other areas of water impoundment. Every effort shall be made by the Contractor to prevent erosion on the site and abutting property.

B. All slopes shall be stabilized by mulching, seeding or otherwise protected as the work progresses to comply with the intent of this specification.

C. All seeding shall include mulch or other protective covering approved by the CTDOT PM.

1. When hay is used as a mulch with seeding, it shall be a minimum of 2 inches.

2. When wood fiber mulch is used, it shall be applied in a water slurry at a rate of 2000 pounds per acre with or immediately after the application of seed, fertilizer and limestone.

D. All damaged slopes shall be repaired as soon as possible. The CTDOT PM shall limit the surface area of earth material exposed if the Contractor fails to sufficiently protect the slopes to prevent pollution.

E. The Contractor shall at all times have on hand the necessary materials and equipment to provide for early slope stabilization and corrective measures to damaged slopes.

F. Temporary channels, ditches and outfalls shall be protected prior to directing water into them to prevent erosion.

G. The erosion control features installed by the Contractor shall be maintained by the Contractor, and he shall remove such installations if ordered by the CTDOT PM. Maintenance of erosion control measures by the Contractor shall include the clean out of accumulated sediment.

H. The Contractor shall operate all equipment and perform all construction operations so as to minimize pollution. The Contractor shall cease any of his operations which will increase pollution during rain storms.

I. The Contractor shall give the CTDOT PM sufficient notice of impending shutdowns to enable the CTDOT PM and Contractor to examine the project and to implement erosion and pollution control work.

J. Sedimentation Control Systems shall be installed by the Contractor in locations shown on the plans or as directed by the CTDOT PM. When hay bales are used they shall be installed as specified in sub-article 3.3.B. Geotextile sedimentation control systems may consist of either a prefabricated geotextile fence or a geotextile fence assembled by the Contractor in the field. Geotextile sedimentation control systems shall be installed so that the bottom 6 inches of the fabric is buried by either trenching or by laying the 6-inch section horizontally on the ground and burying by ramping the soil up to the control fence. All geotextile fences shall be at least 30 inches in exposed height as installed, with not less than a 2-degree and not more than a 20 degree inclination toward the potential silt source. Hardwood posts shall have a minimum cross-section size of at least 1.5 inches x 1.5 inches and a minimum length of 42 inches. Steel posts shall be at least 0.5 pounds per linear foot with a minimum length of 48 inches. Spacing between posts shall not exceed 10 feet, and all posts shall be driven a minimum of 12 inches into the ground. When joints between sections of geotextile sedimentation control systems are necessary, geotextile shall be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed.

The Contractor may use brush as a backing for the geotextile by piling the brush 2 to 3 feet high and then attaching the geotextile to the brush and burying the bottom 6 inches of geotextile as in the previous fence method.

The installations shall be maintained or replaced until they are no longer necessary for the purpose intended or are ordered removed by the CTDOT PM. Clean out of accumulated sediment shall be accomplished when one-half of the original height of the sedimentation control system, as installed, becomes filled with sediment or as ordered by the CTDOT PM.

The geotextile fence systems will be completely removed from the project at the completion of the project, unless specifically authorized by the CTDOT PM to be left in place.

Hay bale systems will be allowed to remain in toe of slope areas unless ordered removed by the CTDOT PM.

Unless a specific type of sedimentation control system is indicated on the plans or directed by the CTDOT PM, the type of system will be at the Contractor's option.

K. Hay Bales shall be placed by the Contractor in locations shown on the plans or as directed by the CTDOT PM. They shall be placed lengthwise with ends of adjacent bales tightly abutting one another. All bales shall be installed so that bindings are oriented around the sides, rather than along the tops and bottoms. Bales shall be entrenched 4 inches and backfilled, with the backfilled soil placed toward the potential silt source. They shall be held in place by two wooden stakes in each bale, with loose straw inserted in voids between the bales. Bales shall be maintained or replaced until they are no longer necessary for the purpose intended or are ordered removed by the CTDOT PM. Clean out of accumulated sediment shall be accomplished when one-half of the original height of the bales as installed becomes filled with sediment or as directed by the CTDOT PM.

L. Anti-Tracking Pad: The filter fabric (geotextile) shall be installed as recommended by the manufacturer for the specific use or purpose intended, or as otherwise directed by the CTDOT PM.

The crushed stone shall be spread by any suitable means to a minimum depth of 8 inches and shall be shaped to a smooth uniform finished grade. The minimum length and width requirements for all Anti-Tracking Pads shall be 50 feet by 25 feet respectively.

The tracking pad shall be maintained in an acceptable condition at all times. Should the stone surface become saturated and ineffective as determined by the CTDOT PM, it shall be removed and replaced with new, clean stone.

There will be no additional payment for maintaining, replacing or repairing the tracking pads. The tracking pads shall be removed at the completion of construction or as directed by the CTDOT PM. The Contractor shall account for such work in the bid price.

M. Geotextile: Geotextile shall be installed at the locations and to the dimensions shown on the plans or as directed by the CTDOT PM. Geotextile shall be installed as recommended by the manufacturer for the specific use or purpose intended, or as otherwise approved by the CTDOT PM.

END OF SECTION 01 57 13

SECTION 01 57 26 – SITE WATERING FOR DUST CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water for Dust Control: This item shall consist of furnishing water equipment, water, and applying it for the purpose of allaying dust conditions.

B. Calcium Chloride for Dust Control: This item shall consist of furnishing calcium chloride and spreading it on the subgrade or in other areas of a project under construction, for the purpose of allaying dust conditions.

1.2 SUBMITTALS

A. See Section 01 33 00, Submittal Procedures for submittal requirements for this work.

B. See Section 01 33 00.13, Document Control for submittal requirements for this work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The materials for this work shall conform to the following requirements:

Calcium chloride shall conform to the requirements of AASHTO M 144, except that the pellet form and the flake form shall be equally acceptable.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. Water for Dust Control: The application of water shall be under the control of the CTDOT PM at all times. It shall be applied only at locations at such times, and in the amount as may be directed by the CTDOT PM.

The Contractor shall have available and maintain in an operable condition at all times, sufficient equipment for the purpose of applying water for dust control. This equipment shall consist of pipelines, tanks, tank-trucks, pumps, meters, hose, distributors or other devices approved by the CTDOT PM. A suitable device for a positive shutoff and for regulating the flow of water shall be located so as to permit positive operator control.

B. Calcium Chloride for Dust Control: Calcium chloride shall be applied only at the locations, at such times and in the amount as may be directed by the CTDOT PM. It shall be spread in such a manner and by such devices that uniform distribution is attained over the entire area on which it is ordered placed

END OF SECTION 01 57 26

SECTION 01 57 30 INDOOR ENVIRONMENTAL CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Construction Documents and general provisions of the Contract, including General Conditions of the Contract for Construction and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Microbial and fungal contamination control.

2. Indoor air quality and pollution control.

3. Heating, ventilating, and air conditioning.

B. The project is not intended for LEED or Green Globes certification.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 45 23.13 "Testing for IAQ, Baseline IAQ & Materials" for building flush out requirements.

2. Division 01 Section 01 57 40 "Construction IAQ Management Plan" for a description of the IAQ management plan.

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM D5116-2006, Standard Guide for Small-Scale Environmental Chamber Determination of Organic Emissions From Indoor Materials/Products.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 MICROBIAL AND FUNGAL CONTAMINATION CONTROL

A. Perform, schedule, and sequence Work as required to limit conditions supporting formations of microbes, molds, and fungi.

1. Control water penetration, dampness, and humidity to prevent products not treated for exterior use from becoming soaked or damp.

2. Enclose building prior to installing interior materials and finishes.

3. Do not install interior products subject to moisture absorption until building is enclosed and wet work generating moisture and humidity is complete.

B. When visible formations are observed and when formations cannot be completely removed by non-abrasive surface cleaning:

1. Remove and replace materials identified as food sources for microbes, molds, and fungi.

2. Correct conditions supporting microbial, mold, and fungal growth.

C. Remove interior products and finishes, identified as food sources that have absorbed sufficient moisture to become damp whether or not microbial, mold, or fungal growth is observed. Include:

1. Gypsum board cores.
2. Organic materials composed of cellulose fiber or paper.
3. Materials containing sucrose or other binders identified as supporting microbial growth.

D. Remove fibrous insulation materials subject to retaining moisture such as duct liner, insulation, and other materials that are made wet or damp and cannot immediately be made dry.

E. Repair or replace ductwork, pans, and other conditions subject to moisture condensation, water penetration, or other water source not drained and made dry.

1. Remove conditions that have become an environment for microbes, molds, or fungi.
2. Do not permit conditions leading to standing water.

F. Install wet work and allow time needed to dry and cure prior to installing materials such as carpet, acoustical material, textiles, and other material of type that may attract and retain moisture.

3.2 INDOOR AIR QUALITY AND POLLUTION CONTROL

A. Product Emission Rate Standards: Test to ASTM D5116 for maximum indoor air concentration levels.

1. **Formaldehyde:**
   a. 0.03 parts per million where no other requirements are specified.
   b. 0.005 parts per million where products are specified as formaldehyde free.
2. **Total VOC Emissions for Carpet Tile, Adhesives, and Sealers:** 0.05 mg/m^2 per hour.
3. **4 Phenyl Cyclohexene (4-PC) Particulate Emissions for Carpet:** One (1) part per billion.
4. **Total Particulate Emission Rate Levels:** 50 ug/m^3.
5. **Primary and Secondary Regulated Pollutants:** Conform to USEPA, Code of Federal Regulations, Title 40, Part 50 National Air Ambient Air Quality Standard. Refer to EPA Web Site http://www.epa.gov/epahome/rules.html#codified.
6. **Other Pollutants Not Listed:** Not greater than 1/10 of Threshold Limit Value - Time Weighted Average (TLV-TWA) industrial workplace standard.

B. Architectural Coatings - Volatile Organic Compound (VOC) Content Limits: Conform to US Environmental Protection Agency (EPA) Federal Register 48886/Vol. 63, No.176 Friday, September 11, 1998/ Rules and Regulations. Refer to EPA Web Site: http://www.epa.gov/ttn/atw/eparules.html.

C. Do not use products in combination with or in contact with other products that can be identified as combining to form toxic fumes or sustained odors.

D. Do not use solvents within interior areas that may penetrate and be retained in absorptive materials such as concrete, gypsum board, wood, cellulose products, fibrous material, and textiles.

E. Protect construction materials from contamination and pollution from contact with construction dust, debris, fumes, solvents, and other environmentally polluting materials.

F. Allow furnishings and materials such as carpet, floor tile, acoustical tile, textiles, office furniture, and casework, to air out in clean environment prior to installation.

3.3 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

A. Do not run permanent HVAC system during course of construction. Seal ductwork intake and exhaust vents.

B. Heat, dehumidify, and ventilate building during course of Work as necessary to maintain environmental conditions suitable for drying and curing materials and for prevention of conditions suitable for mold and mildew growth.

1. Ventilate building to remove moisture, dust, fumes, and odors.
2. Temper and dehumidify air as needed to remove excess moisture.
3. Do not use propane heaters and other moisture generating heating systems.

C. Flush out building prior to commissioning. Refer to Section 01 45 23.13 "Testing for IAQ, Baseline IAQ & Materials" for procedure.

D. Inspect ductwork for refuse, contaminants, moisture and other foreign contamination prior to commissioning. Notify Commissioning Agent (CxA) of satisfactory inspection prior to beginning of Commissioning.

3.4 REMEDIAL ACTION

A. Promptly take action as necessary to inspect and remediate conditions suspected of supporting microbial, fungal or mold conditions and where contaminated by indoor air pollution.

B. Notify and consult with CT DOT Project Manager prior to beginning remedial action where contamination by hazardous chemicals, microbes, and fungi is suspected.

END OF SECTION 01 57 30

SECTION 01 57 40 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 specification sections, apply to this section.

1.2 SUMMARY

A. This Section includes:

1. Description of a Construction Indoor Air Quality (IAQ) Management Plan.
2. IAQ construction requirements.

B. The project is not intended for LEED or Green Globes certification.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Divisions 01 through Division 44 specification sections for sustainable design requirements specific to the Work of each of those sections.
2. Division 01 Section 01 45 23.13 Testing for IAQ, Baseline IAQ, & Materials"
3. Division 01 Section 01 57 30 Indoor Environmental Control.
4. Division 01 Section 23 05 93 Testing, Adjusting and Balancing for HVAC for additional requirements for baseline testing for IAQ.
5. Division 01 Section 23 05 93 Testing, Adjusting and Balancing for HVAC for cleaning of HVAC system including ductwork, air intakes and returns, and changing of filters.

1.3 REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):

1. ASHRAE Standard 52.1-1992, Gravimetric and Dust Spot Procedures for Testing Air Cleaning Devices in General Ventilation for Removing Particulate Matter.

B. ASTM International, Inc. (ASTM):

1. ASTM D5116-2006, Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

C. Sheet Metal and Air Conditioning National Contractors' National Association (SMACNA):

1. IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition 2008.

1.4 INDOOR AIR QUALITY

A. Goals: The Owner has set the following indoor air quality goals for jobsite operations on the project, within the limits of the construction schedule, Contract Sum, and available materials, equipment, products and services. Goals include:

1. Protect workers on the site from undue health risks during construction.
2. Prevent residual problems with indoor air quality in the completed building.

1.5 SUBMITTALS

A. Indoor Air Quality Plan: Within **fourteen (14)** days after receipt of **Notice to Proceed** and prior to any waste removal from the project, develop and submit for review a healthy indoor air quality plan. The plan shall include:

1. List of IAQ protective measures to be instituted on the site.
2. Schedule for inspection and maintenance of IAQ measures.

1.6 QUALITY ASSURANCE

A. Perform material tests and report results in accordance with ASTM D5116.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Should the Contractor desire to use procedures, materials, equipment, or products that are not specified but meet the intent of the specifications to protect indoor air quality on the site, the Contractor shall propose these substitutions in accordance with Section 01 60 00 "Product Requirements."

2.2 MATERIALS

A. Low emitting products have been specified in appropriate sections.

PART 3 - EXECUTION

3.1 CONSTRUCTION IAQ MANAGEMENT PLAN

A. Meet or exceed the minimum requirements of the SMACNA "IAQ Guidelines for Occupied Buildings Under Construction."

1. Protect the ventilation system components from contamination, OR provide cleaning of the ventilation components exposed to contamination during construction prior to occupancy.
2. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14000 cu ft of outdoor air per sq ft of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60 percent.
   a. See Division 01 Section 01 45 23.13 "Testing for IAQ, Baseline IAQ & Materials" for building flush out requirements.
3. If building occupancy is to occur before completion of the flush-out, deliver a minimum of 3500 cu ft of outdoor air per sq ft of floor area to the space. Once the space is occupied, ventilate it at a minimum rate of 0.30 cfm/sq ft of outside air or the design minimum outside air rate determined in accordance with Sections 4 through 7 of ASHRAE 62.1 or applicable local code, whichever is more stringent. During each day of the flush-out period, begin ventilation a minimum of three (3) hours prior to occupancy and continue during occupancy. Maintain these conditions until a total of 14000 cu ft/sq ft of outside air has been delivered to the space.

B. During installation of carpet, paints, furnishings, and other VOC-emitting products, provide supplemental (spot) ventilation for at least 72 hours after work is completed. Preferred HVAC system operation uses supply air fans and ducts only; exhaust provided through windows. Use exhaust fans to pull exhaust air from deep interior locations. Stair towers and other paths to exterior can be useful during this process.

C. Conduct regular inspection and maintenance of indoor air quality measures including ventilation system protection, and ventilation rate.

D. Require VOC-safe masks for workers installing VOC-emitting products (interior and exterior) defined as products that emit 150 gpl or more UNLESS local jurisdiction's requirements are stricter, in which case the strictest requirements shall be followed for use of VOC-safe masks.

E. Use low-toxic cleaning supplies for surfaces, equipment, and worker's personal use. Options include several soybean-based solvents and cleaning options (SoySolv) and citrus-based cleaners.

F. Use wet sanding for gypsum board assemblies. Exception: Dry sanding allowed subject to CT DOT Project Manager's approval of the following measures:

   1. Full isolation of space undergoing finishing.
   2. Plastic protection sheeting is installed to provide air sealing during sanding.
   3. Closure of all air system devices and ductwork.
   4. Sequencing of construction precludes the possibility of contamination of other spaces with gypsum dust.
   5. Worker protection is provided.

G. Use safety meetings, signage, and Contractor agreements to communicate the goals of the construction indoor air quality plan.

END OF SECTION 01 57 40

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

B. **Related Sections:** The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 25 00 Substitution Procedures specifies administrative procedures for handling requests for substitutions made after award of the Contract.

2. Division 01 Section 01 33 00 Submittal Procedures specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.

3. Division 01 Section 01 33 00.13 Document Control for submission requirements and processes.

4. Division 01 Section 01 42 20 Reference Standards and Definitions specifies the applicability of industry standards to products specified.

1.3 DEFINITIONS

A. Definitions used in this Section are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, which is current as of the date of the Contract Documents.

2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

1.4 QUALITY ASSURANCE

A. **Source Limitations:** To the fullest extent possible, provide products of the same kind from a single source.

B. **Compatibility of Options:** When the Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.

2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:

a. Name of product and manufacturer.

b. Model and serial number.

c. Capacity.

d. Speed.

e. Ratings.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Store products in accordance with manufacturers' instructions and maintain within temperature and humidity range required by manufacturer.

4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.

7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation.

8. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

9. Store loose granular material on solid surfaces in a well-drained area; prevent mixing with foreign matter.

10. Arrange storage to provide access for inspection. Periodically inspect to insure products are undamaged and are maintained under required conditions. Keep log showing date, time and problems, if any.

11. Stone, masonry units and similar materials shall be stored on platforms or dry skids and shall be adequately covered and protected against damage.

12. Materials and equipment shall be delivered, stored and handled to prevent intrusion of foreign matter and damage by weather or breakage. Packaged materials shall be delivered and stored in original, unbroken packages.

13. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct and products are undamaged.

14. Packages, materials and equipment showing evidence of damage will be rejected and replaced at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.

1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:

1. Semi-proprietary Specification Requirements: Where Specifications name two (2) or more products or manufacturers, provide one (1) of the products indicated. Comply with the requirements of Division 01 Section 01 25 00 "Substitution Procedures."
2. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
3. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
4. Visual Selection: Where specified product requirements include the phrase *"...as selected from manufacturer's standard colors, patterns, textures..."* or a similar phrase, select a product and manufacturer that complies with other specified requirements. The CT DOT Project Manager will select the color, pattern, and texture from the product line selected.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01 60 00

SECTION 01 71 23 FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. General: This Section specifies administrative and procedural requirements for field engineering services including, but not limited to, the following:

1. Land survey work.

2. Civil Engineering services.

3. Damage surveys.

4. Geo-technical monitoring.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 31 00 Project Management and Coordination for procedures for coordinating field engineering with other construction activities.

2. Division 01 Section 01 33 00 Submittal Procedures for submitting Project record surveys.

3. Division 01 Section 01 33 00.13 Document Control for submittal requirements and processes

4. Division 01 Section 01 77 00 Closeout Procedures for submitting final property survey with Project Record Documents and recording of Owner-accepted deviations from indicated lines and levels.

1.3 SUBMITTALS

A. Certificates: Submit a certificate from the Land Surveyor stating that the control information furnished by the Owner is accurate or identify inaccuracies, if they exist. The Contractor shall not take advantage of errors, which may be included in the control information. Stakes and markings shall be preserved.

B. Final Property Survey: Prepare and submit 10 copies of the final property survey. Submit 2 electronic copies of the final property survey.

C. Project Record Documents: Submit a record of Work performed and record survey data as required under provisions of "Submittals" and "Project Closeout" Sections.

1.4 QUALITY ASSURANCE

A. Provide field engineering services to establish and record grades, lines and elevations.

B. The Contractor shall retain a Land Surveyor registered by the State of Connecticut to confirm State furnished base lines and benchmarks, lay out the building, underground utility lines and other site work from the information furnished by the Owner and to establish and record the necessary elevations, at no additional cost to the State.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Identification: The Owner will identify two (2) base lines on the Contract Drawings.

B. Verify layout information shown on the Drawings, in relation to the property survey and existing benchmarks. Notify the CT DOT Project Manager of any discrepancies immediately in writing before proceeding to lay out the Work. Locate and protect existing benchmarks and base line. Preserve permanent reference points during construction.

1. Do not change or relocate benchmarks or base line without prior written approval. Promptly report lost or destroyed reference points or requirements to relocate reference points because of necessary changes in grades or locations.

2. Promptly replace lost or destroyed Project baseline benchmarks. Base replacements on the original survey control points.

C. Establish and maintain a sufficient quantity of (minimum of 2) permanent benchmarks on the site, referenced to data established by Owner supplied information.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

D. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction.

1. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping. Notify the CT DOT Project Manager of any discrepancies prior to proceeding.

3.2 PERFORMANCE

A. Work from lines and levels established by the property survey. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

1. Advise entities engaged in construction activities of benchmarks and control points for their use.

2. As construction proceeds, check every major element for line, level, and plumb.

B. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference.

1. Record deviations from required lines and levels, and advise the CT DOT Project Manager when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.

2. On completion of foundation walls, major site improvements, underground utilities, and other Work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, elevations of construction, as-built locations and site work.

C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels, and control lines and levels required for mechanical and electrical work.

E. Existing Utilities: Furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, services, or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction.

F. Final Property Survey: Prepare a final property survey showing significant features (real property) for the Project. Include on the survey a certification, signed by the surveyor, that principal metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey.

END OF SECTION 01 71 23

SECTION 01 71 23.16 – CONSTRUCTION SURVEYING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description: under this item, the Contractor shall perform, including related administrative and procedural requirements, the following: construction layout and staking, field engineering and surveying, utility locations, general support services related to proposed construction methodology involving structural integrity or personnel safety, and civil engineering services.

Submit a certificate signed by the Contractor and co-signed by a Land Surveyor or Professional Engineer certifying that the location and elevation of improvements comply with the Contract.

Submit a record of Project work performed and project data as required under provisions of Section 01 33 00 Submittal Procedures.

See Division 01, Section 01 33 00.13 Document Control for submittal requirements and processes.

Engage a Land Surveyor licensed in the State of Connecticut who is experienced in providing land-surveying services of the kind indicated.

Engage a Professional Engineer of the discipline required, licensed in the State of Connecticut, to perform engineering services of the kind indicated.

B. Related Sections: Division 01 Section 01 33 00.13 Document Control for requirements related submissions and the use of the Primavera Construction Manager.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Project Record Drawings: Appropriate scale electronic final drawings and electronic files shall be submitted to the CT DOT Project Manager. Drawings shall conform to an "Existing Building Location Survey" with a Class T-2 accuracy standard in accordance with the Connecticut General Statues, Section 20-300b.

B. Cooperation by Contractor: The Contractor shall maintain in good order, in a secure, fire-resistant location at the Project site, 2 copies of all plans, Project Specifications, Addenda, approved Shop Drawings, Product Data, Product Samples, Construction Orders, and other modifications, schedules and instructions. The Contractor shall mark one set of these documents to record all changes made during construction. The other set shall be kept clean of all markings. Both sets shall be available to the CTDOT PM at all times. The Contractor shall maintain a complete set of Record Drawings by maintaining a clean, undamaged set of blue or black line prints of Contract drawings and Shop Drawings. The Contractor shall mark whichever drawings within the set that are most capable of showing conditions fully and accurately where the actual installation varies substantially from the Project work as

originally shown. Where Shop Drawings are used, the Contractor shall record a cross-reference at the corresponding location on the Contract drawings. The Contractor shall give particular attention to concealed elements that would be difficult to measure and record at a later date. The Contractor shall (1) mark record sets with red erasable pencil, (2) use other colors to distinguish between variations in separate categories of the Project work, (3) mark new information that was not shown on Contract drawings or Shop Drawings, (4) note related Addenda and construction order dates where applicable.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the work. Furnish location data for Project work that must be performed by public utilities serving the Project Site.

B. Furnish information that is necessary to adjust, move or relocate existing structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

C. The existing benchmarks, control points and property corners are shown on the plans.

D. Verify layout information shown on the plans, in relation to the control points and existing benchmarks before proceeding to layout the Project work. Notify the CT DOT Project Manager if discrepancies are discovered. Locate existing permanent benchmarks, control points, and similar reference points before beginning Project work. Preserve and protect permanent benchmarks and control points during construction operations. Do not change or relocate benchmarks or control points without the CT DOT Project Manager’s prior written approval. Promptly report lost or destroyed control points, or the need to relocate permanent benchmarks or control points because of necessary changes in grades or locations. Promptly replace lost or destroyed benchmarks and control points. Base replacements on the original survey control points.

E. Establish and maintain a minimum of (2) permanent benchmarks on the Project Site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark. Record benchmark locations, with horizontal and vertical data, on Project Record Documents. Provide temporary reference points sufficient to locate the work where the actual location or elevation of layout points cannot be marked. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

F. Construction methodology shall be the Contractor's sole responsibility including the cost of using engineering services and recommendations as necessary. Inform the CT DOT Project Manager of any anticipated or encountered problems in construction methodology. Proceed with work only when such problems are fully resolved by the Contractor, using such engineering support services as required.

G. Work from lines and levels established by the control survey. Establish benchmarks and control points to set lines and levels at each area of construction as needed to locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale plans to determine dimensions. Advise entities engaged in construction activities, of marked lines and levels provided for their use. As construction proceeds, check every major element for line, level and plumb.

H. Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes and invert elevations by instrumentation and similar appropriate means. The Contractor shall identify and document by survey the extent, elevation, and location of all foundations and capped utilities to be left in place and backfilled. Appropriate scaled electronic drawings and files shall be furnished to the CT DOT Project Manager PRIOR to backfilling.

I. Locate and lay out control lines and levels for structures, building foundations, column grids and locations, floor levels including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from (2) or more locations.

J. Maintain a surveyor's log of control and other survey work. Make this log available to the CT DOT Project Manager for reference. Record deviations from required lines and levels, and advise the CT DOT Project Manager when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted by the CT DOT Project Manager and not corrected. Record the location of utilities at the time of installation in the log as well as on electronic drawing files and mylar for permanent record. The recording Land Surveyor shall place its registration seal and accuracy statement regarding location of exterior underground utility lines on the utility plans of As-Built electronic drawings and files.

END OF SECTION 01 71 23.16

SECTION 01 73 29 CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for cutting and patching.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 31 00 Project Management and Coordination for procedures for coordinating cutting and patching with other construction activities.

2. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

a. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 21, 22, 23, 26, 27, and 28 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 SUBMITTALS

A. Cutting and Patching Schedule: Submit a schedule to the CT DOT Project Manager describing procedures well in advance of the time cutting and patching will be performed and if the Owner's Representative and/or Engineer requires approval of these procedures before proceeding. Request approval to proceed. Include the following information, as applicable, in the schedule:

1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.

2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

3. Describe affects to integrity of weather exposed or moisture resistant element.

4. Describe affects to efficiency, maintenance, or safety of any operational element.

5. Describe affects to Work of Owner or separate contractor.

6. List products to be used and firms or entities that will perform Work.

7. Indicate dates when cutting and patching will be performed.

B. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.

1. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations sealed by an Engineer registered in the State of Connecticut showing integration of reinforcement with the original structure.

1.4 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1. Obtain approval from the CT DOT Project Manager of the cutting and patching schedule before cutting and patching the following structural elements:
   a. Foundation construction.
   b. Bearing and retaining walls.
   c. Structural concrete.
   d. Structural steel.
   e. Lintels.
   f. Structural decking.
   g. Miscellaneous structural metals.
   h. Exterior curtain-wall construction.
   i. Equipment supports.
   j. Piping, ductwork, vessels, and equipment.
   k. Structural systems of special construction in Division 13 Sections.

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

1. Obtain CT DOT Project Manager's and Engineer's approval of the cutting and patching schedule before cutting and patching the following operating elements or safety related systems:
   a. Primary operational systems and equipment.
   b. Air or smoke barriers.
   c. Water, moisture, or vapor barriers.
   d. Membranes and flashings.
   e. Fire protection systems.
   f. Noise and vibration control elements and systems.
   g. Control systems.
   h. Communication systems.
   i. Conveying systems.
   j. Electrical wiring systems.
   k. Operating systems of special construction in Division 13 Sections.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the CT DOT Project Manager's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually satisfactory manner.

1.5 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. Use materials whose installed performance will equal or surpass that of existing materials.

B. The Contractor shall install sleeves, inserts and hangers furnished by the trades needing same.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, notify the CT DOT Project Manager before proceeding with corrective action.

B. Openings and chases may not be shown on the Drawings. It is the responsibility of the Contractor to examine the complete set of Contract Drawings including, but not limited to, the Architectural, Electrical, Heating, Cooling, Ventilating and Plumbing Drawings and to provide chases, channels or openings where needed.

1. After installing Work into openings, channels and/or chases, the Contractor shall close same. If finishes are to be restored, the new Work shall match the original and shall be done by the trade customarily responsible for the particular kind of Work.

C. The Contractor shall verify dimensions for built-in Work and/or Work adjoining that of other trades before ordering any material or doing any Work. Discrepancies shall be submitted to the CT DOT Project Manager before proceeding with the Work.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Work that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

2. Do perform cutting and patching to integrate elements of Work. Provide penetrations of existing surfaces. Provide samples for testing. Seal penetrations through floors, walls, ceilings and roofs, as applicable; restore or preserve fire-rated and smoke-barrier construction. Construction and finishes shall match original Work.

B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.

1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.

4. Comply with requirements of applicable Division 32 Sections where cutting and patching requires excavating and backfilling.

5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.

4. Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.4 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01 73 29

SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for waste management goals, waste management plan and waste management plan implementation. The project is not intended for LEED certification.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 11 00 "Summary of Work".

2. Division 01 Section 01 20 00 "Contract Considerations".

3. Division 01 Section 01 25 00 "Substitution Procedures".

5. Division 01 Section 01 33 00 "Submittal Procedures".

6. Division 01 Section 01 33 00.13 “Document Control”.

7. Division 01 Section 01 45 00 "Quality Control".

8. Division 01 Section 01 50 00 "Temporary Facilities and Controls".

9. Division 01 Section 01 60 00 "Product Requirements".

10. Division 01 Section 01 77 00 "Closeout Procedures".

11. Division 01 Section 01 81 13 "Sustainable Design Requirements".

1.3 DEFINITIONS

A. Construction Waste: Solid wastes such as building materials, packaging and rubble resulting from construction, paving and infrastructure.

B. Demolition Waste: Solid wastes such as concrete, wood, brick, plaster, roofing materials, wallboard, metals, carpeting, insulation, and clean fill resulting from demolition or selective demolition of structures.

C. Recyclable Materials: Products and materials that can be recovered and remanufactured into a new product. Recyclable materials include, but are not limited to, the following:

1. Metals (ferrous and non-ferrous), including banding, metal studs, ductwork, and piping.

2. Asphaltic concrete paving.

3. Portland cement concrete.

4. Gypsum products.

5. Paper and cardboard.

6. Wood products, including structural, finish, crates, and pallets.

7. Brick and masonry.

8. Carpet and padding.

9. Plastics.

10. Copper wiring.

D. Recycling Facility: A business that specializes in collecting, handling, processing, distributing, or remanufacturing waste materials generated by new construction projects, into products or materials that can be used for this project or by others.

E. Salvage and Reuse: Existing usable product or material that can be saved and reused in some manner on the project site. Materials for reuse must be approved by the Construction Administrator. Materials that can be salvaged and reused must comply with applicable technical specifications and include, but are not limited to, the following:

1. Dimensional lumber and other wood products.

2. Structural steel.

3. Soil.

4. Masonry products.

5. Plants.

F. Salvage for Resale: Existing usable product that can be saved and removed intact (as is) from the project site to another site for resale to others without remanufacturing.

1.4 WASTE MANAGEMENT GOALS

A. The Owner has established that this Project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.

B. The Contractor shall use all means available to divert the greatest extent practical and economically feasible, construction waste from landfills and incinerators.

C. Of the inevitable waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized.

D. With regard to these goals the Contractor shall develop, for the Construction Administrator's review, a Waste Management Plan for this Project.

E. Take a pro-active, responsible role in management of construction waste and require all trade contractors, vendors, and suppliers to participate in the effort. Establish a construction waste management program that includes the following categories:

1. Minimizing packaging waste.

2. Salvage and reuse.

3. Salvage for resale or donation.

4. Recycling.

5. Disposal.

1.5 SUBMITTALS

A. Draft Waste Management Plan: Within 30 days after receipt of Notice of Award of Bid, or prior to any waste removal, whichever occurs sooner, the Contractor shall submit three (3) copies of a Draft Waste Management Plan to the CT DOT Project Manager.

B. Final Waste Management Plan: Once the CT DOT Project Manager has determined which of the recycling options addressed in the Draft Waste Management Plan are acceptable, the Contractor shall submit within 10 days three (3) copies of a Final Waste Management Plan.

C. Progress Reports: Submit three (3) copies of quarterly progress reports, at the same time as the Application for Payment, documenting the following:

1. Material category.
2. Point of waste generation.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, in tons.
5. Quantity of waste recycled, in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

D. Record Submittals:

1. **Donations:** Indicate which salvageable materials were donated, who they were donated to, and whether the recipient is tax exempt. Submit documentation indicating receipt of donations.
2. **Sales:** Indicate which salvageable materials were sold, who they were sold to, and whether the recipient is tax exempt. Submit documentation indicating receipt of materials.
3. **Recycling:** Indicate which materials were recycled and the name of the facility licensed to accept them. Submit documentation such as manifests, weight tickets, receipts, and invoices.
4. **Waste Disposal:** Indicate which materials were accepted as waste by landfills and incinerator facilities licensed to accept them. Submit documentation indicating receipt of materials.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with regulations of State of Connecticut Department of Environment Protection, Waste Management Bureau Recycling Program.

B. Waste Management Conference: Review and discuss the waste management plan, requirements for documenting quantities of each type of waste and its disposition, procedures for materials separation, procedures for periodic collection and transportation to recycling and disposal facilities. Review waste management requirements for each trade. Verify availability of containers and bins needed to avoid delays.

1.7 WASTE MANAGEMENT PLAN

A. Draft Waste Management Plan: Include the following in the Draft Plan:

1. Analysis of the proposed jobsite waste to be generated, including types and quantities.
2. **Landfill Options:** The name of the landfill(s) where trash will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all Project waste in the landfill(s).
3. **Alternatives to Landfilling:** A list of each material proposed to be salvaged, reused, or recycled during the course of the Project, the proposed local market for each material, and the estimated net cost savings or additional costs resulting from separating and recycling (versus landfilling) each material. "Net" means that the following have been subtracted from the cost of separating and recycling:

a. Revenue from the sale of recycled or salvaged materials and

b. Landfill tipping fees saved due to diversion of materials from the landfill. The list of these materials is to include, at a minimum, the following materials:

1) Cardboard.

2) Clean dimensional wood.

3) Beverage containers.

4) Land clearing debris.

5) Concrete.

6) Bricks.

7) Concrete Masonry Units (CMU).

8) Asphalt.

9) Metals from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

B. Resources for Development of Waste Management Plan: The following sources may be useful in developing the Draft Waste Management Plan:

1. Recycling Haulers and Markets: Local haulers and markets for recyclable materials. For more information, contact the State of Connecticut Department of Environmental Protection, Waste Management Bureau Recycling Program, (860) 424-3365,

www.dep.state.ct.us/wst/recycle/ctrecycle.htm.

C. Final Waste Management Plan: The Final Waste Management Plan shall contain the following:

1. Analysis of the proposed jobsite waste to be generated, including types and quantities.

2. Landfill Options: The name of the landfill(s) where trash will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all Project waste in the landfill(s).

3. Alternatives to Landfilling: A list of the waste materials from the Project that will be separated for reuse, salvage, or recycling.

4. Meetings: A description of the regular meetings to be held to address waste management.

5. Materials Handling Procedures: A description of the means by which any waste materials identified in item (3) above will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

6. Transportation: A description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials.

1.8 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: The Contractor shall designate an on-site party (or parties) responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the Project.

B. Distribution: The Contractor shall distribute copies of the Waste Management Plan to the Job Site Foreman, each Trade contractor, the CT DOT Project Manager, and the Architect.

C. Instruction: The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.

D. Separation Facilities: The Contractor shall lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

E. Hazardous Wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations.

F. Application for Progress Payments: The Contractor shall submit with each Application for Progress Payment a Summary of Waste Generated by the Project. The Summary shall be submitted on a form acceptable to the CT DOT Project Manager and shall contain the following information:

1. The amount (in tons or cubic yards) of material landfilled from the Project, the identity of the landfill, the total amount of tipping fees paid at the landfill, and the total disposal cost. Include manifests, weight tickets, receipt, and invoices.

2. For each material recycled, reused, or salvaged from the Project: the amount (in tons or cubic yards), the date removed from the jobsite, the receiving party, the transportation cost, the amount of any money paid or received for the recycled or salvaged material, and the net total cost or savings of salvage or recycling of each material shall be indicated. Attach manifests, weight tickets, receipts, and invoices.

PART 2 – PRODUCTS

(Not Applicable)

PART 3 – EXECUTION

3.1 PLAN IMPLEMENTATION

A. Implement the waste management plan as approved by CT DOT Project Manager.

B. Provide training of workers, contractors, trade contractors, and suppliers on proper waste management procedures.

1. Distribute waste management plan to all parties involved in the Project within **three (3) working** days of submittal return.

2. Distribute plan to parties when they first begin working on the Project site. Review plan procedures and locations established for salvage, recycling, and disposal.

3.2 SEPARATION OF RECYCLABLE WASTE MATERIALS

A. Provide the necessary containers and bins, to facilitate the waste management program, that are clearly and appropriately marked. Prevent contamination of recyclable materials from incompatible products and materials. Separate construction waste at the project site by one of the following methods:

1. **Source Separated Method:** Waste products and materials, that are recyclable, are separated from trash and sorted into appropriately marked separate containers and then transported to the respective recycling facility for further processing. Trash is transported to a landfill or incinerator.
2. **Co-Mingled Method:** All construction waste is placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed and the remaining trash is transported to a landfill or incinerator.
3. Other methods proposed by the Contractor and approved by the CT DOT Project Manager.

END OF SECTION 01 74 19

SECTION 01 75 00 STARTING AND ADJUSTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for handling requests for building system start up and system demonstration and includes the following:

1. Starting Systems.

2. Demonstration and instructions.

3. Testing, adjusting, and balancing.

B. **Related Sections:** The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 45 00 Quality Control specifies quality assurance and inspecting services.

2. Division 01 Section 01 77 00 Closeout Procedures specifies requirements for contract close out requirements for system operation and maintenance data and extra materials.

3. Division 01, Section 01 91 00 Commissioning specifies process requirements for system commissioning.

4. Division 23, Section 23 08 00 " HVAC Systems Commissioning" specifies requirements HVAC&R system commissioning.

1.3 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Provide written notification to the CT DOT Project Manager 30 days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, and control sequence for other conditions that may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components are complete and tested.

F. Execute the start-up under supervision of manufacturer’s representative, in accordance with manufacturer’s instructions.

G. When referenced in individual specification sections, require manufacturer to provide an authorized representative to be present at the site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Division 01 Section 01 45 00 "Quality Control" that the equipment or system has been properly installed and is functioning properly.

1.4 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner and Agency Personnel thirty (30) days prior to substantial completion.

B. Demonstrate project equipment and instruct in a classroom environment at location designated by the CT DOT Project Manager and instructed by a qualified manufacturer's representative who is knowledgeable about the Project.

C. For equipment or systems requiring seasonal operation perform demonstration for season within six (6) months.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner and Agency Personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance, and shutdown of each item at agreed upon scheduled time and at equipment or designated location.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during demonstration.

G. Starting and adjusting equipment does not constitute acceptance by the owner since commissioning is a requirement of this contract. Additionally, the warrantee does not begin until substantial completion has been granted for that specific item.

H. Professionally video record of the Owner's maintenance personnel and provide copies of the recording in the format specified by the CTDOT PM.

1.5 TESTING, ADJUSTING, AND BALANCING

A. The Contractor will employ and pay for the testing services of an independent consultant to verify the testing, adjusting, and balancing. This effort shall be separate from the verification work provided by the Owner's Consultant specified below.

1. Comply with the requirements of Division 01 Section 01 91 00 "Commissioning" as they relate to the Work of this Section.

B. Reports will be submitted by the independent testing consultant to the CT DOT Project Manager indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.

C. The Owner may employ and pay for the services of an independent consultant to verify testing, adjusting, and balancing which was performed by the Contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 75 00

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:

1. Inspection procedures.

2. Project record document submittal.

3. Operation and maintenance manual submittal.

4. Submittal of warranties.

5. Final cleaning.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 11 00 "Summary of Work".

2. Division 01 Section 01 29 76 "Progress Payment Procedures".

C. Closeout requirements for specific construction activities may be included in the appropriate Sections in Divisions 02 through 49.

1.3 SUBSTANTIAL COMPLETION

A. General: Basic contract definitions are included in Article 1 of the General Conditions of the Contract for Construction.

B. Preliminary Procedures: Before requesting inspection for Certification of Substantial Completion, complete the following.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.

a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Advise the CT DOT Project Manager of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.

4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, certificates of compliance, operating certificates, and similar releases.

5. Submit record drawings, maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.

6. Deliver tools, spare parts, extra stock, and similar items.

7. Advise the Owner's personnel of changeover in security provisions. The Owner shall make final changeover of permanent locks.

8. Demonstrate, through operation and testing, the functions of all systems and/or equipment to the satisfaction of the Owner for compliance to the Contract. Complete testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.

9. Complete final cleanup requirements.

10. Certify that required training of personnel is complete.

C. Inspection Procedures: The Contractor shall be ready and prepared when they request a Substantial Completion inspection. If the inspection reveals that the work is not complete, that there are extensive punchlist items that will take more than forty five (45) days to complete and as the items listed in Paragraph 1.3 above are not complete, the CT DOT Project Manager and Engineer will determine the inspection has failed.

D. The Contractor is responsible for all costs to re-inspect due to a failed inspection. The CT DOT Project Manager will issue a deduct change order to cover all costs for re-inspection.

1. The CT DOT Project Manager will repeat inspection when requested and assured that the Work is substantially complete.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for "Certificate of Acceptance" and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Owner's final inspection list of items to be completed or corrected, endorsed and dated by the CT DOT Project Manager. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the CT DOT Project Manager.

4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the Work.

5. Submit consent of surety to Final Payment.

6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

7. Touch up and otherwise repair and restore marred, exposed finishes, including touchup painting.

B. Re-inspection Procedure: The Inspection Group will re-inspect the Work upon receipt of notice from the CT DOT Project Manager that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the CT DOT Project Manager.

1. Upon completion of re-inspection, the CT DOT Project Manager will prepare a Certificate of Acceptance. If the Work is incomplete, the CT DOT Project Manager will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

1.5 AS-BUILT DOCUMENT and AS-BUILT REVIT MODEL SUBMITTALS

A. General: The Contractor shall not use As-built Drawings for construction purposes. Protect contractor As-built Drawings from deterioration and loss in a secure, fire-resistant location. Provide access to As-built Drawings for the Owner's reference during normal working hours. Keep documents current; do not permanently conceal any work until required information has been recorded. **IMPORTANT NOTE: <u>Failure to keep As-Built Documents and As-Built REVIT model current is sufficient cause to withhold progress payments.</u>**

1. The Contractor shall also hire the services of a Surveyor registered in the State of Connecticut to conduct a final survey to determine the location of exterior underground utility lines and to record the results, and update existing electronic documents and media.

2. The record of exterior underground utilities shall be made at the time of installation on Mylar film drawing and AutoCAD (latest version) compatible files and disks. The drawing shall bear the seal of the Land Surveyor and a statement of accuracy.

B. As-Built Drawings and As-Built REVIT models: The Contractor shall maintain one (1) clean, complete undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Modify REVIT models of the design to show As-Built conditions. Update As-Built REVIT Models and As-Built Drawings on a monthly basis coincident with the submittal of the Application for Payment.

1. Mark record sets with erasable pencil to distinguish between variations in separate categories of the Work.

2. Mark all new information that is not shown on Contract Drawings.

3. Note related change-order numbers where applicable.

4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

5. Organize work in REVIT models consistent with the work performed by the Engineer. Change systems for each discipline in the model for that discipline. Perform coordination review. Maintain Central models and Manage Links. Avoid using Detail Lines to indicate changes in favor of indicating the work using 3-D elements. Do not modify organization of Views and Sheets. Provide new Title Block. Print suitable titles, dates, and other identification on the cover of each set.

6. Upon completion of the work, the Contractor shall submit Record Drawings to the CT DOT Project Manager for the Owner's Records who will pass them on to the Engineer for review.
7. Submit completed REVIT models to CT DOT PM on CD.
8. Submit electronic format data of all Coordination Drawings as required by the CT DOT Project Manager, at no additional cost.
9. Refer to Section 01 45 00 "Quality Control" Paragraph 1.3 for required as-built drawings, REVIT model, and specifications for fire alarm systems.

C. **Record Specifications:** The Contractor shall maintain one (1) complete paper copy and one electronic copy of the Project Manual, including Addenda. Include with the Project Manual one (1) copy of other written construction documents, such as Change Orders and modifications issued in printed and/or electronic form during construction.

1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
2. Give particular attention to equals and substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
3. Note related record drawing information and Product Data.
4. Upon completion of the Work, submit Record Specifications to the CT DOT Project Manager for the Owner's records.

D. **Record Product Data:** The Contractor shall maintain one (1) copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.

1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
3. Upon completion of markup, submit complete set of Record Product Data to the CT DOT Project Manager for the Owner's records.

E. **Record Sample Submitted:** Immediately prior to Substantial Completion, the Contractor shall meet with the CT DOT Project Manager, Owner and the Owner's personnel at the Project Site to determine which Samples are to be transmitted to the Owner for record purposes. Comply with the Owner's instructions regarding delivery to the Owner's Sample storage area.

F. **Miscellaneous Record Submittals:** Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the CT DOT Project Manager for the Owner's records.

G. **Maintenance Manuals:** Organize operation and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual, heavy-duty, 2-inch, 3-ring, D-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder according to Division 01 Section 01 78 23 "Operation & Maintenance Data". Included but not limited to the following types of information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.
5. Recommended "turn-around" cycles.
6. Inspection procedures.
7. Shop Drawings and Product Data.
8. Fixture lamping schedule.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials.
4. Tools.
5. Lubricants.
6. Fuels.
7. Identification systems.
8. Control sequences.
9. Hazards.
10. Cleaning.
11. Warranties and bonds.
12. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Startup.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

3.2 FINAL CLEANING

A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 01 Section 01 50 00 "Temporary Facilities and Controls."

B. Cleaning: Employ professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion and Certification of Occupancy.

2. Interior:

a. Remove labels that are not permanent labels.

b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Remove paint spots; wash and polish glass.

c. Clean exposed interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

d. Wash washable surfaces of mechanical, electrical equipment and fixtures and replace filters, clean strainers on mechanical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

e. Clean and polish finish hardware.

f. Clean and polish tile and other glazed surfaces.

g. Clean floors; wax and buff resilient tile. Clean vinyl or rubber base.

h. Vacuum and/or dust walls, ceilings, lighting fixtures, ceiling diffusers and other wall and ceiling items.

i. Remove defacements, streaks, fingerprints and erection marks.

3. Exterior:

a. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth, even-textured surface.

b. Cleanout all storm catch basins within the limits of construction of any silt or debris washed in during the construction period.

c. Clean exposed exterior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances.

d. Clean roofs, gutters and downspouts.

e. Remove waste and surplus materials, rubbish and construction equipment and facilities from the site, and deposit it legally elsewhere.

f. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Remove paint spots; wash and polish glass.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the work of rodents, insects, and other pests. Provide results of final inspection in writing.

D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the CT DOT Project Manager.
2. Leave building clean and ready for occupancy. If the Contractor fails to clean up, the Owner may do so, with the cost charged to the Contractor. The Owner will issue a credit change order to cover the costs.

END OF SECTION 01 77 00

SECTION 01 78 23 OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 00 General Conditions and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for operation and maintenance manuals, including the following:

1. Preparing and submitting operation and maintenance manuals for building operating systems and equipment.

2. Preparing and submitting instruction manuals covering the care, preservation, and maintenance of architectural products and finishes.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 33 00 "Submittal Procedures" specifies preparation of Shop Drawings and Product Data.

2. Division 01 Section 01 33 00.13 Document Control for submittal requirements and processes.

3. Division 01 Section 01 75 00 "Starting and Adjusting" specifies instruction of the Owner and Agency operating personnel in the operation and maintenance of building systems and equipment and the general requirements for starting-up equipment and systems.

4. Division 01 Section 01 77 00 "Closeout Procedures" specifies general closeout requirements.

5. Division 01 Section 01 78 30 "Warranties and Bonds" specifies requirements for submittal of warranties and bonds.

6. Division 01 Section 01 81 13 "Sustainable Design Requirements" specifies requirements for submittals related to sustainable design documentation.

7. Division 01 Section 01 91 00 “Commissioning” specifies requirements for submittals related Commissioning.

8. Appropriate Sections of Divisions 02 through 49 specify special operation and maintenance data requirements for specific pieces of equipment or building operating systems.

1.3 QUALITY ASSURANCE

A. Maintenance Manual Preparation: In preparation of maintenance manuals, use personnel thoroughly trained and experienced in operation and maintenance of equipment or system involved.

1. Where maintenance manuals require written instructions, use personnel skilled in technical writing where necessary for communication of essential data.

2. Where maintenance manuals require drawings or diagrams, use draftsmen capable of preparing drawings clearly in an understandable format.

B. Instructions for the Owner and Agency Personnel: The Construction Manager must use experienced instructors thoroughly trained and experienced in operation and maintenance of equipment or system involved, to instruct the Owner's operation and maintenance personnel.

C. Commissioning (Cx) Coordination: The Commissioning process requires detailed O&M documentation. The Contractor must submit O&M manuals to the CT DOT Project Manager for review and approval by Commissioning Agent (CxA).

1.4 SUBMITTALS

A. Submittal Schedule: Comply with the following schedule for submitting operation and maintenance manuals:

1. Before Substantial Completion, when each installation that requires operation and maintenance manuals is nominally complete, submit four (4) draft copies of each manual to the Owner’s Representative, Commissioning Agent (CxA), Agency Representative, and Engineer for review. Include a complete index or table of contents of each manual.
   - **a.** The Owner’s Representative will return one (1) copy of the draft with comments within twenty - one (21) calendar days of receipt.
   - **b.** Submit four (4) copies of data in final form at least twenty-one (21) calendar days before final inspection. The Owner’s Representative will return one (1) copy within twenty-one (21) calendar after final inspection, with comments.
2. After final inspection, make corrections or modifications to comply with the Commissioning Agent’s (CxA), Engineer's, and Agency Representative’s comments. Submit final copies to the Owner’s Representative within twenty-one (21) calendar days of receipt of the Commissioning Agent’s (CxA), Engineer's, and Agency Representative’s comments.

B. Form of Submittal: Prepare operation and maintenance manuals in the form of an instructional manual for use by the Owner's operating personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder.

1. Binders: For each manual, provide heavy-duty, commercial-quality, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8-1/2-by-11- inch paper. Provide a clear plastic sleeve on the spine to hold labels describing contents. Provide pockets in the covers to receive folded sheets.
   - **a.** Where two (2) or more binders are necessary to accommodate data, correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.
   - **b.** Identify each binder on front and spine, with the printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter covered. Indicate volume number for multiple volume sets of manuals.
2. **Dividers:** Provide heavy paper dividers with celluloid-covered tabs for each separate section. Mark each tab to indicate contents. Provide a typed description of the product and major parts of equipment included in the section on each divider.
3. **Protective Plastic Jackets:** Provide protective, transparent, plastic jackets designed to enclose diagnostic software for computerized electronic equipment.

4. **Text Material:** Where maintenance manuals require written material, use the manufacturer's standard printed material. If manufacturer's standard printed material is not available, provide specially prepared data, neatly typewritten, on 8-1/2-by-11-inch, 20-lb/sq ft white bond paper.

5. **Drawings:** Where maintenance manuals require drawings or diagrams, provide reinforced, punched binder tabs on drawings and bind in with text.

   a. Where oversize drawings are necessary, fold drawings to the same size as text pages and use as a foldout.

   b. If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in front or rear pocket of binder. Insert a typewritten page indicating drawing title, description of contents, and drawing location at the appropriate location in the manual.

1.5 MANUAL CONTENT

A. In each manual include information specified in the individual Specification Section and the following information for each major component of building equipment and its controls:

1. General system or equipment description.
2. Design factors and assumptions.
3. Copies of applicable shop drawings and product data.
4. System or equipment identification, including:
   a. Name of manufacturer.
   b. Model number.
   c. Serial number of each component.
5. Operating instructions.
6. Emergency instructions.
7. Wiring diagrams.
8. Inspection and test procedures.
9. Maintenance procedures and schedules.
10. Precautions against improper use and maintenance.
11. Copies of warranties.
12. Repair instructions including spare parts listing.
13. Sources of required maintenance materials and related services.
14. Manual index.

B. Organize each manual into separate sections for each piece of related equipment. As a minimum, each manual shall contain a title page; a table of contents; copies of product data, supplemented by drawings and written text; and copies of each warranty, bond, and service contract issued.

1. **Title Page:** Provide a title page in a transparent, plastic envelope as the first sheet of each manual. Provide the following information:
   a. Subject matter covered by the manual.
   b. Name and address of the Project.
   c. Date of submittal.

d. Name, address, and telephone number of the Construction Manager.

e. Name and address of the Engineer and Owner's Representative.

f. Cross-reference to related systems in other operation and maintenance manuals.

2. Table of Contents: After title page, include a typewritten table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.

a. Where a system requires more than one volume to accommodate data, provide a comprehensive table of contents for all volumes in each volume of the set.

3. Provide a general information section immediately following table of contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the subcontractor or Installer and the maintenance subcontractor. Clearly delineate the extent of responsibility of each of these entities. Include a local source for replacement parts and equipment.

4. Product Data: Where the manuals include manufacturer's standard printed data, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where the Project includes more than one (1) item in a tabular format, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation, and delete references to information that is not applicable.

5. Written Text: Prepare written text to provide necessary information where manufacturer's standard printed data is not available, and the information is necessary for proper operation and maintenance of equipment or systems. Prepare written text where it is necessary to provide additional information or to supplement data included in the manual. Organize text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operation or maintenance procedure.

6. Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems or to provide control or flow diagrams. Coordinate these drawings with information contained in project record drawings to assure correct illustration of the completed installation.

a. Do not use original Record Documents as part of operation and maintenance manuals.

7. Warranties and/or Bonds: Provide a copy of each warranty and/or bond in the appropriate manual for the information of the Owner's operating personnel. Provide written data outlining procedures to follow in the event of product failure. List circumstances and conditions that would affect validity of warranty or bond.

1.6 MATERIAL AND FINISHES MAINTENANCE MANUAL

A. Submit four (4) copies of each manual, in final form, on material and finishes to the Owner's Representative for distribution. Provide **one (1)** section for architectural products, including applied materials and finishes. Provide a second section for products designed for moisture protection and products exposed to the weather.

1. Refer to individual Specification Sections for additional requirements on care and maintenance of materials and finishes.

B. Architectural Products: Provide manufacturer's data and instructions on care and maintenance of architectural products, including applied materials and finishes.

1. Manufacturer's Data: Provide complete information on architectural products, including the following, as applicable:

a. Manufacturer's catalog number.

b. Size.

c. Material composition.

d. Color.

e. Texture.

f. Reordering information for specially manufactured products.

2. Care and Maintenance Instructions: Provide information on care and maintenance, including manufacturer's recommendations for types of cleaning agents to be used and methods of cleaning. Provide information on cleaning agents and methods that could prove detrimental to the product. Include manufacturer's recommended schedule for cleaning and maintenance.

C. Moisture Protection and Products Exposed to the Weather: Provide complete manufacturer's data with instructions on inspection, maintenance, and repair of products exposed to the weather or designed for moisture-protection purposes.

1. Manufacturer's Data: Provide manufacturer's data giving detailed information, including the following, as applicable:

a. Applicable standards.

b. Chemical composition.

c. Installation details.

d. Inspection procedures.

e. Maintenance information.

f. Repair procedures.

1.7 EQUIPMENT AND SYSTEMS MAINTENANCE MANUAL

A. Submit four (4) copies of each manual, in final form, on equipment and systems to the Owner’s Representative for distribution. Provide separate manuals for each unit of equipment, each operating system, and each electric and electronic system.

1. Refer to individual Specification Sections for additional requirements on operation and maintenance of the various pieces of equipment and operating systems.

B. Equipment and Systems: Provide the following information for each piece of equipment, each building operating system, and each electric or electronic system.

1. Description: Provide a complete description of each unit and related component parts, including the following:

a. Equipment or system function.

b. Operating characteristics.

c. Limiting conditions.

d. Performance curves.

e. Engineering data and tests.

f. Complete nomenclature and number of replacement parts.

2. **Manufacturer's Information:** For each manufacturer of a component part or piece of equipment, provide the following:

   a. Printed operation and maintenance instructions.

   b. Assembly drawings and diagrams required for maintenance.

   c. List of items recommended to be stocked as spare parts.

3. **Maintenance Procedures:** Provide information detailing essential maintenance procedures.

4. **Operating Procedures:** Provide information on equipment and system operating procedures, including the following:

   a. Startup procedures.

   b. Equipment or system break-in.

   c. Routine and normal operating instructions.

   d. Regulation and control procedures.

   e. Instructions on stopping.

   f. Shutdown and emergency instructions.

   g. Summer and winter operating instructions.

   h. Required sequences for electric or electronic systems.

   i. Special operating instructions.

5. **Servicing Schedule:** Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.

6. **Controls:** Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.

7. **Identification Drawings:** Provide each Subcontractor's Identification Drawings.

   a. Provide as-installed, color-coded, piping diagrams, where required for identification.

8. **Valve Tags**: Provide charts of valve-tag numbers, with the location and function of each valve.

9. **Circuit Directories:** For electric and electronic systems, provide complete circuit directories of panel boards, including the following:

   a. Controls.

   b. Communication.

C. Electronic Media:

1. For equipment which requires maintenance by operational personnel, provide a professionally developed DVD for the use of maintenance training for the facility. Each DVD will be accompanied by a written index which can be utilized to find any specific item of information by time or place on the DVD.

2. The Construction Manager is responsible for this production. This DVD will be provided to the Owner’s Representative at the same time as the delivery of the other maintenance material.

3. The DVD must be able to be edited for future changes to the equipment and modifications as they occur.

1.8 COMMISSIONING RECORD AND TESTING DATA MANUAL

The Contractor shall cooperate with Commissioning Agent (CxA) in the preparation of a separate Manual dedicated to documenting the Commissioning process which will include all certifications and testing data and some repeating of O&M data. Description of this Manual is found in Section 01 91 00 Commissioning and shall be prepared by the Commissioning Agent (CxA).

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 78 23

SECTION 01 78 30 WARRANTIES AND BONDS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Construction Manager period for correction of the Work.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section 01 33 00 Submittal Procedures specifies procedures for submitting warranties.

2. Division 01 Section 01 33 00.13 Document Control for submittal requirements and processes.

3. Division 01 Section 01 77 00 Closeout Procedures specifies contract closeout procedures.

4. Division 01 Section 01 78 23 Operation and Maintenance Data specifies required operation and maintenance data.

5. Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

6. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Construction Manager of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and trade contractors required to countersign special warranties with the Construction Manager.

1.3 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Construction Manager is responsible for the cost of replacing or rebuilding

defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Construction Manager presents evidence that entities required to countersign such commitments are willing to do so.

F. The Construction Manager shall guarantee all materials and workmanship for a period of 18 months from the date of Substantial Completion of the Work. In addition, the Construction Manager shall furnish the warranties listed below. Submit four (4) copies of each to the CT DOT Project Manager in the supplier's standard form or in the form given below if there is no standard form available.

1.	Section 03 36 00	Concrete Floor Finishes: 5-year, material and workmanship.
2.	Section 07 54 00	Thermoplastic Membrane Roofing, Base Flashing and Insulation: 10-year unlimited, materials and installation: 15-year, material and workmanship. Also, 2-year Contractor's warranty for installation.
3.	Section 07 42 64	Aluminum Composite Material Wall Panels: 20-year against rupture, cracks or perforation due to corrosion. Also, 20-year for fluorocarbon finish (if used) against peeling, blistering, fading and chalking as limited by industry standards. Plus 10-year weather tightness warranty by installer.
4.	Section 07 72 00	Roof Accessories: 5-year product and installation, including weather tightness.
5.	Section 07 14 00	Fluid-Applied Waterproofing: 5-year material and workmanship.
6.	Section 07 25 00	Air Barriers: the term offered for the Specific product.
7.	Section 07 90 05	Joint Sealers: Exterior - Interior caulking and sealants: 5-year, material and workmanship.
8.	Section 07 62 00	Sheet Metal Flashing and Trim: 3-year, material and workmanship.
9.	Section 08 11 13	Hollow Metal Doors and Frames: Lifetime for interior doors, 5-year for exterior doors.
10.	Section 08 33 23	Overhead Coiling Doors: 5-year material and workmanship.
11.	Section 08 44 13	Glazed Aluminum Curtain Walls
12.	Section 08 62 23	Tubular Skylights: 5-year product and installation, including weather tightness.
13.	Section 08 71 00	Door Hardware: Closers, Locksets, Exit Bolts: Longest term offered by manufacturer for grade/class of particular item, material and workmanship.
14.	Section 08 80 00	Glazing: Insulating glass: 10-year against failure of hermetic seal, interpane dusting or misting including replacement of unit.

15.	Section 08 43 13	Aluminum-Framed Storefront: 5-year material and workmanship (insulating glass separate). Air and water infiltration and strength to specified AAMA designation.
16.	Section 10 28 00	Toilet, Bath and Laundry Accessories: 15-years against silver spoilage.
17.	Section 14 20 10	Passenger Elevators: Material workmanship, installation for 24 months.
18.	Section 23 29 23	Variable Frequency Drives
19.	Section 26 09 23	Lighting Control Devices: 8-years, material and installation.
20.	Section 26 28 16	Enclosed Switches and Circuit Breakers: 5-years, material and installation.
21.	Section 26 32 13	Engine Generators: 10-years, material and installation.
22.	Section 26 51 00	Emergency Lighting Batteries: 10-years, material and installation.
23.	Section 26 51 00	Lighting Ballasts: 5-years, material and installation.
24.	Section 32 17 23.13	Painted Pavement Markings: 18 Months materials and workmanship
25.	Section 33 41 10	Pumping Station: 5 years for pumps and 18 months for all other equipment.

G. Submit certification that finish materials are fire rated as specified.

H. Form of Guarantees and Warranties:

Commissioner
Department of Transportation
2800 Berlin Turnpike
Newington, Connecticut 06111
(Project Title and Number)

I (We) hereby guarantee and warranty)

the _____ work on the referenced project for a period of _____ years

from _____, 20___ against failures of workmanship and materials in accordance

with the requirements of Section ____, Page ____, Paragraph ____, of the Specifications.

Signed _____

Construction Manager _____
(or authorized agent)

I. Bonds shall be by approved Surety Companies, made out to the Commissioner, Department of Transportation, on company's standard form.

J. Guarantees, warranties or bonds supplied by Trade contractors, Suppliers or Manufacturers shall reference the project name, number, and location and be certified by the Construction

Manager to be for the product and installation on the project and must be countersigned by the Construction Manager.

1.4 SUBMITTALS

A. Submit written warranties prior to the date certified for Substantial Completion. If the Owner's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.

B. Forms for special warranties are included in this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Construction Manager, or by the Construction Manager, trade contractor, supplier, or manufacturer. Submit a draft to the Owner, through the CT DOT Project Manager, for approval prior to final execution.

1. Refer to Divisions 02 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Form of Submittal: At Final Completion compile two (2) copies of each required warranty properly executed by the Construction Manager, or by the Construction Manager, trade contractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

D. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.

2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Construction Manager.

3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 01 78 30

SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements and procedures for compliance with the sustainability goals of the project.

B. Related Sections:

1. This project is not intended for LEED certification.

2. Divisions 01 through 44 Sections for requirements specific to the work of each of these Sections.

1.2 SUBMITTALS

A. Sustainability Submittals:

1. Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over time

2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Construction indoor-air-quality management plan.

a. Product data for temporary filtration media.

b. Product data for filtration media used during occupancy.

c. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.

d. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.

e. Product data for filtration media used during flush-out and during occupancy.

f. Report from testing and inspecting agency indicating results of indoor-air-quality testing and documentation showing compliance with indoor-air-quality testing procedures and requirements.

4. Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.

5. Product data for paints and coatings used inside the weatherproofing system indicating chemical composition and VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.

6. Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.

PART 2 - PRODUCTS

2.1 RECYCLED CONTENT OF MATERIALS

A. Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 10 percent of cost of materials used for Project.

1. Cost of post-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.

2. Cost of pre-consumer recycled content of an item shall be determined by dividing weight of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.

2.2 LOW VOC-EMITTING MATERIALS

A. For field applications that are inside the weatherproofing system, use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D:

1. Wood Glues: 30 g/L.

2. Metal to Metal Adhesives: 30 g/L.

3. Adhesives for Porous Materials (Except Wood): 50 g/L.

4. Subfloor Adhesives: 50 g/L.

5. Plastic Foam Adhesives: 50 g/L.

6. Carpet Adhesives: 50 g/L.

7. VCT and Asphalt Tile Adhesives: 50 g/L.

8. Cove Base Adhesives: 50 g/L.

9. Gypsum Board and Panel Adhesives: 50 g/L.

10. Rubber Floor Adhesives: 60 g/L.

11. Ceramic Tile Adhesives: 65 g/L.

12. Multipurpose Construction Adhesives: 70 g/L.

13. Fiberglass Adhesives: 80 g/L.

14. Contact Adhesive: 80 g/L.

15. Structural Glazing Adhesives: 100 g/L.

16. Wood Flooring Adhesive: 100 g/L.

17. Special Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, Teflon, ultra-high molecular weight polyethylene, rubber or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.

18. Top and Trim Adhesive: 250 g/L.

19. Plastic Cement Welding Compounds: 250 g/L.

20. ABS Welding Compounds: 325 g/L.

21. CPVC Welding Compounds: 490 g/L.

22. PVC Welding Compounds: 510 g/L.

23. Adhesive Primer for Plastic: 550 g/L.

24. Plastic Cement Welding Compounds: 350 g/L.

25. ABS Welding Compounds: 400 g/L.

26. CPVC Welding Compounds: 490 g/L.

27. PVC Welding Compounds: 510 g/L.

28. Adhesive Primer for Plastic: 650 g/L.

29. Sheet Applied Rubber Lining Adhesive: 850 g/L.

30. Aerosol Adhesive, General Purpose Mist Spray: 65 percent by weight.

31. Aerosol Adhesive, General Purpose Web Spray: 55 percent by weight.

32. Special Purpose Aerosol Adhesive (All Types): 70 percent by weight.

33. Other Adhesives: 250 g/L.

34. Architectural Sealants: 250 g/L.

35. Nonmembrane Roof Sealants: 300 g/L.

36. Single-Ply Roof Membrane Sealants: 450 g/L.

37. Other Sealants: 420 g/L.

38. Sealant Primers for Nonporous Substrates: 250 g/L.

39. Sealant Primers for Porous Substrates: 775 g/L.

40. Modified Bituminous Sealant Primers: 500 g/L.

41. Other Sealant Primers: 750 g/L.

B. For field applications that are inside the weatherproofing system, use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D and the following chemical restrictions:

1. Flat Paints, Coatings, and Primers: VOC not more than 50 g/L.

2. Nonflat Paints, Coatings, and Primers: VOC not more than 150 g/L.

3. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.

4. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.

5. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.

6. Floor Coatings: VOC not more than 100 g/L.

7. Shellacs, Clear: VOC not more than 730 g/L.

8. Shellacs, Pigmented: VOC not more than 550 g/L.

9. Stains: VOC not more than 250 g/L.

10. Flat Interior Topcoat Paints: VOC not more than 50 g/L.

11. Nonflat Interior Topcoat Paints: VOC not more than 150 g/L.

12. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.

13. Clear Wood Finishes, Varnishes and Sanding Sealers: VOC not more than 350 g/L.

14. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.

15. Floor Coatings: VOC not more than 100 g/L.

16. Shellacs, Clear: VOC not more than 730 g/L.

17. Shellacs, Pigmented: VOC not more than 550 g/L.

18. Stains: VOC not more than 250 g/L.

19. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.

20. Dry-Fog Coatings: VOC not more than 400 g/L.

21. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.

22. Pretreatment Wash Primers: VOC not more than 420 g/L.

23. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

24. Restricted Components: Paints and coatings shall not contain acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, or vinyl chloride.

C. Do not use composite wood or agrifiber products or adhesives that contain urea-formaldehyde resin.

PART 3 - EXECUTION

3.1 MEASUREMENT AND VERIFICATION

A. Implement a measurement and verification plan consistent with LEED Credit EA 5: Option B: Energy Conservation Measure Isolation in the EVO's "International Performance Measurement

and Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction".

B. Evaluate energy performance and efficiency by comparing actual to predicted performance.

C. Measurement and verification period shall cover at least one year of postconstruction occupancy.

END OF SECTION 01 81 13

SECTION 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the owner's operational needs. This is achieved by beginning in the design phase and documenting design intent and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction, and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:

1. Verify that the applicable equipment and systems are installed in accordance with the contact documents and according to the manufacturer's recommendations.
2. Verify and document proper integrated performance of equipment and systems.
3. Verify that Operations & Maintenance documentation is complete.
4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
5. Verify that the Owner's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
6. Document the successful achievement of the commissioning objectives listed above.

B. The purpose of the Commissioning Process is to provide the Owner with independent verification that the systems to be commissioned have been installed according to the contract documents and operate within the performance guideline set in the Owner's Project Requirements, the Basis of Design, the construction drawings and these specifications. The Commissioning Authority will provide the Owner's Representative with independent, unbiased, objective view of the system's installation, operation and performance. The commissioning process does not alleviate or reduce the responsibility of the design professionals or installing contractors to provide a complete and finished product, installed and fully functional in accordance with the contract documents.

C. Commissioning is intended to enhance the quality of system start-up and aid in the orderly transfer of systems for use by the Owner. Quality commissioning requires participation by all parties involved with the design and construction process, including the Owner, Engineer Design Team, Construction Manager and sub-contractors, and Owner's Facilities Management. The Commissioning Authority will lead the commissioning team planning and coordinating all commissioning activities in conjunction with the design professionals, project manager, contractors, manufacturers and equipment vendors. In addition, training of the Facilities Management will be verified and final project O&M Documents will be reviewed for completeness.

D. Where individual testing, adjusting, or related services are required in the project specifications and not specifically required by this commissioning requirements specification, the specified

services shall be provided and copies of documentation, as required by those specifications shall be submitted to the Owner and the Commissioning Agent to be indexed for future reference.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Architectural, Electrical, and Mechanical provisions and other Division 1 Specification Sections, apply to the Work of this Section.

B. Owner's Project Requirements.

C. Basis of Design

D. Contractor and Vendor field start-up reports.

E. Contractor QA/QC Testing reports.

F. Close-out documentation including O&M Manuals.

G. Related Sections:

1. Other Division 01 Specification Sections
2. Section 01 77 00 "Closeout Procedures"
3. Section 01 78 23 "Operation and Maintenance Data"
4. Section 07 08 00 "Commissioning of Thermal and Moisture Protection"
5. Section 08 08 00 "Commissioning of Openings"
6. Section 22 08 00 "Plumbing Systems Commissioning"
7. Section 23 08 00 "HVAC Systems Commissioning"
8. Section 26 08 00 "Electrical Systems Commissioning"

1.3. REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with all applicable requirements and standards.

1.4. SUMMARY

A. This Section establishes general and administrative requirements pertaining to commissioning of equipment, devices, and building systems installed on renovation and new construction projects delivered under various contracting methodologies. Technical requirements for commissioning of particular systems and components are established in the Contract Documents.

B. The project is not intended for LEED or Green Globes certification.

C. It is of primary concern that all operable systems installed in the Project perform in accordance with the Contract Documents and the specified Owner's operational needs. During Commissioning, the Contractor systematically demonstrates to the Owner that the operable systems are properly performing in strict accordance with the Contract Documents.

D. Commissioning consists of systematically documenting that specified components and systems have been installed and started up properly and then functionally tested to verify and document proper operation through all sequences of operation and conditions. In addition, training of the Owner's Operations Personnel will be verified and final project O&M Documents will be reviewed for completeness.

1.5. ADMINISTRATIVE REQUIREMENTS

A. Perform commissioning services for the system. Expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. The commissioning requires cooperation of the Contractor, trade contractors, vendors, suppliers, Engineer, Commissioning Agent, CTDOT PM and Owner's Representative.

1.6. ABBREVIATIONS

A. Abbreviations: The following are common abbreviations used in this *Specification* and in the *Commissioning Plan.*

A/E	Design Engineers	GC	Contractor
CA or CxA	Commissioning Authority	CM	Contractor
CIR	Corrective Issue Record	IC	Installing Trade Contractor
CT	Commissioning Team	MC	Mechanical Trade Contractor
Cx	Commissioning	PFC	Pre-Functional Checklist
Cx Plan	Commissioning Plan Document	Subs	Subs to Prime Contractors
EC	Electrical Trade Contractor	TAB	Test, Adjusting and Balance Trade Contractor (If independent)
FPT	Functional Performance Test	BAS	Building Automation Systems Trade Contractor

1.7. COORDINATION

A. Commissioning Team: The members of the commissioning team consist of the Commissioning Agent, the Owner (Connecticut Department of Transportation), the Construction Manager/Contractor, Design Engineers (particularly the Mechanical Engineer), the Mechanical Contractor, the Electrical Contractor, the Testing & Balancing representative, the Building Automation Systems Contractor, and any other installing subs or suppliers of equipment. If known, the Owner's building or plant operator/engineer is also a member of the commissioning team.

B. Management: The CA directs and coordinates the commissioning activities and reports to the Owner. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents. The CA's responsibilities are the same regardless of who hired the Commissioning Agent.

C. Scheduling: The CA will work with the CM/GC according to established protocols to schedule the commissioning activities. The CA will provide sufficient notice (generally two weeks' notice) to the CM/GC for scheduling commissioning activities. The CM/GC will integrate all commissioning activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

D. The CA will provide the initial schedule of primary commissioning events, or commissioning milestones, at the initial commissioning meeting. The Commissioning Plan provides a format for this schedule. As construction progresses and more detailed schedules are available from the CM/GC, the CA will adjust the commissioning schedule accordingly.

1.8. COMMISSIONING PROCESS

A. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

1.9. SYSTEMS TO BE COMMISSIONED

A. The following systems are to be commissioned.

1. HVAC Systems..... Section 23 08 00
   a. Chillers (100% Sampling)
   b. Chilled Water Piping Systems (25% Sampling)
   c. Boilers (100% Sampling)
   d. Pumps (100% Sampling)
   e. Air Handling Units (100% Sampling)
   f. Energy Recovery Ventilators (100% Sampling)
   g. VAV terminals (25% Sampling)
   h. Exhaust and Ventilation Fans (25% Sampling)
   i. Unitary Heating and Cooling Systems (25% Sampling)
   j. Building Automation Systems (100% Sampling)
   k. Building Automation System Interface (100% Sampling)
2. Electrical Systems..... Division 26
   a. Lighting Controls Systems
   b. Daylighting Control Systems
   c. Engine Generators
   d. Transfer Switches
3. Plumbing Systems..... Section 22 08 00
   a. Domestic Hot Water Heater

4. Building Envelope ..... Section 07 08 00, 08 08 00

a. Roofs (Asphalt shingles, slate shingles, wood shingles, clay roof tiles, built-up bituminous, modified bituminous, EPDM, PVC, fluid-applied, sprayed polyurethane, flashing & sheet metal, metal roofing, roof specialties, and roof accessories)

b. Exterior Insulation and Finish Systems (EIFS)

c. Curtain Wall Systems (Mullions, glazing, and sealing)

d. Exterior Doors (Revolving, glass leaf, emergency exit, and service)

e. Exterior Windows (Aluminum, steel, glazing, storm)

f. Louvers and Vents

g. Sealants (Caulking, mechanical seals, and wind and vapor barriers)

1.10. DEFINITIONS

A. Acceptance Phase:

1. Phase of construction after Startup and initial checkout when Functional Performance Tests, operation and maintenance documentation review and training occur.

B. Basis of Design (BOD) Document:

1. A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

C. Commissioning Authority:

1. An entity identified by the Owner who plans, schedules, and coordinates the Commissioning Team to implement the Commissioning Process.

D. Commissioning Plan:

1. A document prepared and updated by the Commissioning Authority that outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process. The Commissioning Plan is binding on the contractors. The specifications of this section will take precedence over the Commissioning Plan.

E. Commissioning Process:

1. A quality-focused process for enhancing the delivery of a project. The Process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

2. Commissioning and Cx have the exact same meaning and will be used interchangeably throughout the Contract Documents.

F. Commissioning Team:

1. The individuals who through coordinated actions are responsible for implementing the Commissioning Process.

G. Contractor QA/QC Test Reports:

1. The reports generated through the Construction Phase as required by the specifications for QA/QC activities by the installing contractors including megger tests, piping and duct pressurization testing. These reports are to be copied to the Cx Authority as generated for documentation and review.

H. Corrective Issue Report:

1. A report generated by the Cx Authority during Functional Performance Testing documenting issues found during the testing procedures that require follow-up corrective action.

H. Data Logging:

1. Monitoring flows, currents, status, pressures, etc. of equipment using stand-alone data loggers separate from the control system.

I. Deferred or Seasonal Testing:

1. Functional Performance and Integrated Systems Testing that is performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the testing from being performed during the Testing & Training phase.

J. Deficiency:

1. A condition in the installation or function of a component, piece of requirement or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the design intent/basis of design).

K. Final Cx Report:

1. A report prepared by the Cx Authority includes information from the complete Commissioning Process as defined throughout the Commissioning Plan and will include Training documentation and completed Functional Performance Test documentation and the resolved Corrective Issues Report. This report will be provided to the Owner at the completion of the project.

L. Functional Performance and Integrated Systems Testing:

1. Testing of the dynamic functional and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional Performance and Integrated Systems Testing is the dynamic testing of systems (rather than just components) under full operation. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied modes, varying outside ambient conditions, fire alarm, power failure, etc. The systems are run through all control systems sequences of operation and components are verified to be responding as the sequences state.
2. The Commissioning Authority develops the Functional Performance and integrated systems test procedures in a sequential written form, coordinates, witnesses and documents the actual testing, which is performed by the installing contractor or vendor.
3. Functional Performance and Integrated Systems Testing are performed after completion of the Pre-Functional Checklists and factory/manufacturer start-up procedures.

M. Owner's Project Requirements:

1. A written document that details the functional requirements of the project and the expectations of how the facility will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.

N. Phased Commissioning:

1. Commissioning that is competed in phases (by floors, for example) due to the size of the facility, phased occupancy or other scheduling issues.

O. Pre-Functional Checklist:

1. Example documents prepared by the Cx Authority and issued to the Contractor early in the Construction Phase for duplication and completion. The purpose of the Checklists are to verify that appropriate components are on site, correctly installed, started, operational, and ready for Functional Performance and Integrated Systems Testing. Pre-Functional Checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation.
2. Pre-Functional Checklists augment and can be combined with the manufacturer's start-up checklists but are not a substitute. Manufacturer's start-up checklists are to be provided with the Pre-Functional Checklists to the Cx Authority.

P. Sampling:

1. Functional Performance and/or Integrated Systems Testing may only test a fraction of the total number of identical or near identical pieces of equipment or systems.
2. 100% or sampling percentage each test will be provided in the following commissioning specification sections.

Q. Systems Manual:

1. A manual prepared by the Cx Authority that includes information related to the systems, assemblies and the Commissioning Process, incorporated into a usable information resource, with indices and cross references. Information included in the manual incorporates Owner's Project Requirements, Basis of Design, Commissioning Plan, one-line diagrams, and Functional Performance and Integrated Systems Testing Procedures.

1.11. COMMISSIONING TEAM

A. The Commissioning Team shall consist of a minimum of one (1) Representative for each of the following:

1. Owner.
2. Contractor.
3. Engineer.
4. Prime Contractors.
5. Key sub-Contractors
6. Commissioning Authority.
7. Members appointed by Contractor:

a. Individuals, each having authority to act on behalf of the entity they represent, explicitly organized to implement the Commissioning process through coordinated actions

b. Representatives of Contractor, including but not limited to, Project Manager and Commissioning coordinator, trade contractors, installers, and equipment suppliers. Owner must approve Contractor's Commissioning coordinator.

B. Provision of a fully commissioned system of all materials required under the construction contract is the responsibility of the Contractor. Therefore, Contractor Group members of the Systems Commissioning Team, through participation in the planning, management, and oversight of all construction activities related to equipment approvals, performance testing, and commissioning of the systems identified herein must be able to assure the Owner and the Commissioning Authority that all systems have been properly tested and commissioned.

C. Each Commissioning Team Representative shall have at least five (5) years experience in construction administration along with a thorough understanding of construction project documentation procedures.

D. Each Commissioning Team Representative shall be familiar with ASHRAE Guideline 0 – The Commissioning Process.

E. The Commissioning Authority is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The Commissioning Authority may assist with problem-solving non-conformance or deficiencies, but ultimately that responsibility resides with the CM/GC and the A/E. The primary role of the Commissioning Authority is to develop and coordinate the execution of a testing plan, observe and document performance—that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents.

1.12. ACCEPTANCE

A. By the end of the construction phase, all systems shall be fully functional under all operational modes, including part and full load, and abnormal or emergency conditions. With exception of those tests which must be deferred for reasons discussed under post acceptance.

B. Acceptance is dependent on the completion of all commissioning.

PART 2 – PRODUCTS

2.1. GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.2. VERIFICATION TESTING EQUIPMENT AND INSTRUMENTS

A. Contractor shall provide all tools, instruments, laptop computers, PDA's, software programs and services required to perform system Functional Performance and Integrated Systems Testing procedures. This includes providing the connection to systems to be tested, operation of the test equipment and instrumentation and generating test results as required.

B. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system and equipment performance within the tolerances specified in the Contract Documents and the

Functional Performance or integrated systems test procedures. If not otherwise noted, the following minimum requirements shall apply:

1. Temperature sensors and digital thermometers shall have an accuracy of 0.5°F and a resolution of ±0.1°F.
2. Pressure sensors shall have an accuracy of ±2.0% of the value range being measured (not full range of meter).

C. All testing equipment shall have calibration certificates readily available for review and documentation and shall have been calibrated within the previous 12 months.

2.3. SUBMITTALS AND OPERATIONS & MAINTENANCE MANUALS

A. Contractor shall provide all submittals relating to systems to be commissioned identified in Part 1 above to Engineer Design Team and Cx Authority in electronic format. Information should be provided in PDF format or formats compatible with Microsoft Office applications for PCs. Refer to submittal requirements established in Division 01 for additional requirements.

B. CM/GC shall provide all Operation & Maintenance Manual material identified in Section 01 78 23 and related Sections to Owner, Engineer Design Team and `Commissioning Authority in electronic format. Information should be provided in PDF format or formats compatible with Microsoft Office applications for PCs.

C. Installation and checkout materials that are shipped attached to or inside equipment and the actual field checkout sheet forms used by the factory or field technicians shall be submitted to the Commissioning Authority. All documentation requested by the Commissioning Authority will be included by the Contractors in their O&M manuals.

2.2 MEANS OF ACCESS

A. The Contractor shall provide means for the CxA and Owner Representatives to access, observe and visually confirm proper operation of all equipment and systems. These means shall be in compliance with all OSHA and DOE regulations and the project specific Safety Plan

2.3 UTILITIES AND ACCESSORIES

A. Provide utilities necessary to execute testing and commissioning, including water, fuels, chemicals, batteries and other similar expendable items.

B. Provide any equipment or device required for access, such as ladders, and platforms

PART 3 – EXECUTION

3.1 ROLES AND RESPONSIBILITIES

A. <u>Construction Phase</u>

1. All Parties
   a. Follow the Commissioning Plan and Commissioning Specification requirements.
   b. Attend commissioning scoping meeting and additional meetings, as necessary.
2. Owner's Representative (Provided for information only – Not part of GC/CM responsibility)
   a. Attend Commissioning coordination meetings.

b. Review and approve Construction Phase Commissioning documentation including Cx site observation reports, Functional Performance Test Procedures, the updated Owner's Project Requirements, updated Commissioning Plan, updated Basis of Design, and draft Systems Manual.

c. Review training resumes, plans, handout documentation and schedule prepared by the installation contractors and the Contractor with the Cx Authority with respect to appropriateness to the potential trainees.

3. Engineer Design Team (Provided for information only – Not part of GC/CM responsibility):

   a. Attend Commissioning coordination meetings.

   b. Review and incorporate, as appropriate, the Cx Authority's comments from submittal reviews.

   c. Provide the Cx Authority with copies of each answered RFI, ASIs, ECNs, Change Orders and meeting minutes.

   d. Collaborate with the Cx Authority to develop the final detailed Functional Performance Test Procedures, Integrated System Test Procedures, and Emergency Power / Emergency Systems Procedures for control/building automation systems, based on the system shop drawings and submittals.

   e. Provide any design narratives and sequences documentation required by the Commissioning Authority. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

   f. Prepare and submit the final as-built design intent and operating parameters documentation for inclusion in the O&M manuals.

4. Commissioning Authority (Provided for information only– Not part of GC/CM responsibility):

   a. Conduct a Commissioning Team Kickoff meeting. The intent of the meeting will be to present the commissioning specification requirements, test procedures, and scheduling.

   b. Lead and document Commissioning coordination meetings.

   c. Randomly sample the completion of the Pre-Functional Checklists.

   d. Review and comment on any changes to the Basis of Design document prepared by the Engineer Design Team.

   e. Review the Owners Project Requirements for this facility and assist the Owner's Resident Engineer and the Engineer Design Team with any updates required.

   f. Assist the CM/GC, sub-contractors, and Owner's Project Manager in incorporating Commissioning activities into the master project schedule.

   g. Review equipment shop drawings and coordination drawings applicable to systems to be commissioned concurrent with the Engineer Design Team's review for compliance with the Contract Documents, the Owner's Project Requirements, and the Basis of Design. Submit review comments to the Engineer Design Team for inclusion with their review comments.

h. Review O&M manuals applicable to systems to be commissioned concurrent with the Engineer Design Team's review. Submit review comments to the project team in coordination with the Engineer Design Team's review.

i. Review additional Construction Phase documentation, ASIs, RFIs, Change Orders, Meeting Minutes, and other correspondence required to plan and perform commissioning tasks.

j. Perform site visits, in conjunction with Commissioning meetings, to observe component and system installations. Attend selected planning and job site meetings to obtain information on construction progress.

k. Review TAB execution plan developed by the construction team.

l. Review training resumes, plans, handout documentation and schedule prepared by the installation contractors and the Construction Manager with the Owner's Representative and Facility O&M personnel with respect to appropriateness to the potential trainees.

m. Coordinate selected witnessing of systems/equipment cleaning, QA/QC testing, and startup procedures (as specified in Division 7, 8, 22, 23, and 26) with the Construction Manager.

n. Prepare final Functional Performance Test and Integrated Systems Test Procedures reflective of the approved equipment/system shop drawings and the final Basis of Design. These will be distributed to the Owner's Representative, Engineer Design Team, and Contractor for distribution to all affected contractors for their review, comment, and approval.

5. Contractor (CM/GC):

a. Review Construction Phase Commissioning documentation including but not limited to Cx site observation reports, Pre-Functional Checklists and Cx submittal reviews.

b. Participate in Commissioning coordination meetings.

c. Notify the Commissioning Authority when systems and assemblies are ready for Functional Performance Testing through completion of the Pre-Functional Checklists.

d. Copy all Meeting Minutes to the Commissioning Authority for informational purposes.

e. Provide the Cx Authority with a copy of all shop drawings and submittals associated with the systems being commissioned. These shall be distributed concurrent with the distribution to the Engineer Design Team.

f. Incorporate Commissioning activities into the master project schedule. This scheduling shall involve the Cx Authority and installation contractors. Provide the Cx Authority with schedule updates at least monthly.

g. Consolidate and manage the systems/equipment O&M manual preparation process by the installation contractors. Submit the systems/equipment O&M manuals to the Cx Authority for review and inclusion in the Cx close out documentation prior to submission of completed Pre-Functional Checklists.

h. Manage the training plan submittal process by the installation contractors. Submit training plans to the Cx Authority for review.

i. Schedule and witness equipment and systems cleaning, QA/QC testing, and start-up procedures (as specified in Division 7, 8, 22, 23, and 26). Submit documentation for review by the Owner's Resident Engineer, Engineer Design Team and Cx Authority.

j. Coordinate completion of the Pre-Functional Checklists by the appropriate sub-contractor as the work is accomplished. Submit the completed Pre-Functional Checklists to the Cx Authority prior to certifying systems are ready for Functional Performance Testing.

k. Update the Cx Authority with any construction changes to the systems being commissioned including copies of all relevant Requests for Information and Change Orders.

l. Collaborate with the Engineer Design Team and Cx Authority to develop the final detailed Functional Performance Test and Integrated Systems Test Procedures for control/building automation systems, based on the system shop drawings and submittals.

6. Trade -Contractors:

a. Review and provide input to Construction Phase Commissioning documentation.

b. Participate in Commissioning coordination meetings.

c. Duplicate example Pre-Functional Checklists as provided by the Commissioning Authority and complete each as the work is accomplished and submit to the Contractor prior to the start of the Functional Performance and Integrated Systems Testing.

d. Collaborate with the Engineer Design Team and Commissioning Authority to develop the final detailed Functional Performance and Integrated Systems Test Procedures for systems to be commissioned.

7. Equipment Suppliers:

a. Provide requested submittal data, including detailed start-up and checkout procedures and specific responsibilities of the Owner to keep warranties in force for all commissioned equipment or assemblies.

b. Assist in equipment or assembly testing per agreements with Trade contractors.

c. Include all special tools and instruments, when only available from vendor, specific to a piece of equipment, required for testing equipment according to these Contract Documents in the base bid price to the CM/GC or Trade contractors.

d. Review test procedures for equipment installed by factory representatives.

e. For larger primary equipment, provide the services for the first part of testing, of the technician that conducted start-up.

f. Provide expert qualified staff for equipment training.

B. <u>Testing and Training Phase</u>

1. Owner's Representative (Provided for information only – Not part of GC/CM responsibility):

a. Review and approve the O&M manuals concurrent with review by the Engineer Design Team and the Commissioning Authority.

b. Review and comment on any revisions to the Basis of Design by the Engineer Design Team.

c. Review and comment on resolutions of the Corrective Issues Report.

2. Engineer Design Team (Provided for information only – Not part of GC/CM responsibility):
    a. Participate in the initial Facility O&M Personnel and occupant training session by presenting the project Basis of Design.
    b. Participate in other training as detailed in the training program.
    c. Review systems/equipment cleaning, QA/QC testing, and start-up reports submitted by the contractor.
    d. Review and approve the O&M manuals concurrent with review by the Cx Authority and the Owner's Resident Engineer.
    e. Review and comment on the Commissioning Authority's Corrective Issues reports.
    f. Review and comment on the Final Commissioning Report.
3. Commissioning Authority (Provided for information only – Not part of GC/CM responsibility):
    a. Review systems/equipment cleaning, QA/QC testing, and start-up reports submitted by the contractor.
    b. Witness system and assembly Functional Performance testing. List any deficiencies on systems in the Corrective Issues Report and provide to the Owner, Engineer Design Team, and contractors for review and corrections. Include completed Functional Performance Test Procedures and Integrated Systems Test Procedures within the Final Cx Report.
    c. Review proposed contractor-provided training program to verify that the Owner's Project Requirements are achieved.
    d. Audit the contractor-provided training sessions to verify that the Owner's Project Requirements are achieved.
4. Contractor (CM/GC):
    a. Submit completed Pre-Functional Checklists and appropriate systems/equipment cleaning, QA/QC testing, start-up and balance reports to the Commissioning Authority prior to certifying systems to be commissioned are ready for Functional Performance Testing and Integrated Systems Testing. Provide this certification to the Commissioning Authority in writing with copy to the Owner and the Engineer Design Team.
    b. Coordinate all trade contractor participation and provide any required equipment necessary for Functional Performance Testing and Integrated Systems Testing. Equipment required for testing shall have valid calibration certificates.
    c. Remedy deficiencies identified by the Cx Authority during Functional Performance Testing or Integrated Systems Testing and noted within the Corrective Issues Report.
    d. Coordinate scheduling of the systems and component training sessions with the installation trade contractors for the convenience of the trainees.
    e. Submit equipment spare parts to Facility O&M Personnel as detailed in the Contract Documents.

5. Trade -Contractors:
    a. Demonstrate the performance of assemblies and/or operation of systems to the Cx Authority as required in order to achieve the requirements of the Functional Performance Test Procedures and Integrated Systems Testing.
    b. Correct all deficiencies identified by the Commissioning Team and noted within the Corrective Issues Report.
    c. Implement the training program as detailed in the Contract Documents and documented in the Training Forms.

C. Occupancy Phase

1. Owner's Representative (Provided for information only – Not part of GC/CM responsibility):
    a. Attend 10th month warranty review meeting.
    b. Review and comment on the Final Commissioning Report.
2. Engineer Design Team (Provided for information only – Not part of GC/CM responsibility):
    a. Attend 10th month warranty review meeting.
    b. Coordinate resolution of design non-conformance and/or design deficiencies identified during this phase.
3. Commissioning Authority (Provided for information only– Not part of GC/CM responsibility):
    a. Assemble the final Cx documentation including the Final Commissioning Report. Submit this documentation to the Owner for review and acceptance.
    b. Develop the Systems Manual inclusive of the systems to be commissioned. Insert system descriptions as provided by the Engineer Design Team in the Basis of Design.
    c. Returns to the site at 10 months into the warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy any outstanding issues.
    d. Witness deferred/seasonal Functional Performance testing.
4. Contractor (CM/GC):
    a. Coordinate the necessary trade contractors in the deferred/seasonal Functional Performance and Integrated Systems Testing.
    b. Coordinate the correction of deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal or deferred testing.
    c. Attend 10th month warranty review meeting.
    d. Coordinate the correction of deficiencies identified as being either warranty items or items under the original construction contract.

5. Trade -Contractors:
    a. Execute seasonal or deferred Functional Performance and Integrated Systems Testing, witnessed by the Commissioning Authority, according to the specifications.
    b. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal or deferred testing.
    c. Attend 10th month warranty review meeting.
    d. Address outstanding warranty issues and tasks identified as being under the original construction document.

3.2 PROJECT SCHEDULE

A. Commissioning Authority will provide to the CM/GC identified prerequisite activities or documentation required for Cx activities of the project. The Contractor shall incorporate these Cx activities into the Master Project Schedule. The Commissioning Authority will review and update Cx activities along with the Construction Manager's/Contractor's Master Schedule update.

3.3 SUBMITTALS/SHOP DRAWINGS

A. The Commissioning Authority will review Product Submittals and Shop Drawings during the same review period as the Engineer Design Team for systems identified from a master submittal log of Divisions 7, 8, 22, 23, and 26. The Commissioning Authority will review the Submittals and Shop Drawings for Commissioning Process-related information and conformance to the Owner's Project Requirements and the Basis of Design. The Commissioning review comments will be issued directly to the Engineer Design Team for incorporation with their comments.

B. Contractor shall provide one (1) copy of each submittal directly to the Commissioning Authority concurrently when submitting to the Engineer Design Team.

C. The Commissioning Authority review is not a substitute for A/E review, rather it is a supplement related to commissioned systems and equipment.

3.4 REQUEST FOR INFORMATION

A. The Commissioning Authority will review each RFI relating to system to be commissioned for Commissioning-related information and issue comments directly to the Engineer Design Team as applicable.

B. The Engineer Design Team will include the Commissioning Authority in the distribution of answered and updates or additions to the construction documents including all RFIs, ASIs and Change Orders.

3.5 COMMISSIONING COORDINATION MEETINGS

A. The Commissioning Authorities will conduct periodic Commissioning Coordination Meetings throughout the construction phase of the project. Commissioning Team Members are required to attend these meetings.

B. The purpose of conducting Commissioning Coordination Meetings separate from the regular project progress meetings is to focus on the Commissioning Process activities status, schedule and issues.

C. Commissioning Authority will lead meetings, record meeting minutes and distribute minutes to all attendees with copies to appropriate entities.

D. Commissioning Coordination Meetings to be held at the Construction Manager's/Contractor's Field Office. These meetings will usually be held in conjunction with regularly-scheduled construction progress or OAC meetings.

3.6 QUALITY ASSURANCE TESTING

A. Contractor Field Testing:

1. The Commissioning Authority will receive one (1) copy of ALL systems cleaning, QA/QC testing and start-up reports from the Contractor and assemble for record into the Final Commissioning Report.
2. Refer to Division 7, 8, 22, 23, and 26 for specific testing requirements
3. Refer to Pre-Functional Checklists and Commissioning Status Tracking for documentation requirements associated with Testing.

B. Independent Testing:

1. The Commissioning Authority will receive one (1) copy of ALL independent systems cleaning, QA/QC testing and start-up reports from the Contractor and assemble for record into the Final Commissioning Report.
2. Refer to Division 7, 8, 22, 23, and 26 for specific testing requirements
3. Refer to Pre-Functional Checklists and Commissioning Status Tracking for documentation requirements associated with Testing.

3.7 SUBSTANTIATING SYSTEM READINESS

A. The Commissioning Authority will prepare and issue to the Contractor an example Pre-Functional Checklist form for each system or major piece of equipment to be commissioned. Pre-Functional Checklists are important to ensure that they equipment and systems are installed and operational. It ensures that Functional Performance and Integrated Systems Testing may proceed without unnecessary delays. The Contractor is responsible for modification and duplication of the Pre-Functional Checklists provided by the Commissioning Authority to match the equipment being installed and for completing each Checklist. Each piece of equipment is to receive full pre-functional checkout by the contractors. No sampling strategies are used. The Pre-Functional Checklists for all equipment related to any given system must be successfully completed prior to formal Functional Performance and Integrated Systems Testing of the system. Refer to sample Pre-Functional Checklists in specific commissioning sections following this Section.

B. The Commissioning Authority will monitor and track the completion of the Pre-Functional Checklist forms.

C. The Contractor shall complete the Pre-Functional Checklists, provided by the Commissioning Authority, as follows:

1. Pre-Functional Checklists should be maintained in a binder(s) or electronically at the Contractor's project site office and are subject to review for comparison between the completion level of the Checklists and the status of the work during site observation visits by the Commissioning Authority.

2. Complete Section 1 “Equipment Delivery” of the Pre-Functional Checklist after equipment delivery to the site.
3. Complete Section 2 “Equipment Installation” of the Pre-Functional Checklist after the equipment installation is complete.
4. Complete Section 3 “Equipment Start-up” of the Pre-Functional Checklist after the equipment has been successfully started. The contractor is to forward copies of all manufacturer’s start-up forms and reports to the Commissioning Authority.
5. Complete Section 4 “BAS/Power Monitoring/Lighting Control Integration” of the Pre-Functional Checklist after the equipment and systems control configuration and integration process has been completed.
6. Complete Section 5 “Notification for Testing” of the Pre-Functional Checklist after the equipment if fully operational and ready for Functional Performance and Integrated Systems Testing.
7. Completed and signed Pre-Functional Checklists are a pre-requisite for commencing Functional Performance and Integrated Systems Testing. If field observation indicates a significant deviation from actual installation conditions, all checklists will be returned to the Contractor and Installing Trade contractors for revision and resubmission. Any delays resulting will be the responsibility of the offending Installing Trade contractor.
8. Only individuals that have direct knowledge and witnessed that a line item task on the Pre-Functional Checklist was actually performed shall initial or check off that item.

D. The Contractor shall clearly list any outstanding items from the Pre-Functional Checklists and/or manufacturer start-up reports and checklists that were not completed successfully in the Comments section of the applicable Pre-Functional Checklist. The Commissioning Authority will review any items/issues listed and will address them through discussion with the Engineer Design Team and Construction Manager prior to proceeding with Functional Performance and Integrated Systems Testing.

E. The Contractor shall develop detailed start-up plans for all equipment. These plans shall be reviewed by the Engineer Design Team and the Commissioning Authority for completeness and verification that the manufacturer-recommended procedures have been completed.

1. The contractor responsible for the installation and start-up of the equipment is responsible for developing the start-up plan by combining the Pre-Functional Checklist with the manufacturer’s detailed start-up and checkout procedures and any required quality assurance testing.
2. The contractor shall maintain an updated and annotated copy of the start-up plan that shall be accessible for review by the Engineer Design Team and the Commissioning Authority at periodic intervals.
3. The completed start-up procedures shall be provided along with the completed Pre-Functional Checklists to the Commissioning Authority prior to the Construction Manager’s/Contractor’s certification that the systems are ready for Functional Performance and Integrated Systems Testing.

3.8 OPERATION AND MAINTENANCE DATA

A. The Commissioning Process has special requirements on compiling and submitting Operation and Maintenance Data. O&M Data is required to be submitted to the Commissioning Authority immediately after receipt of the approved submittal from the Engineer Design Team. Refer to Section 017823 for specific requirements for O&M manual contents and submittals.

B. The Commissioning Authority will compile the information into the project Systems Manual which will be used during Training Sessions in conjunction with the O&M Manuals.

3.9 PHASED COMMISSIONING/TESTING

A. The project may require start-up and initial checkout to be executed in phases. This phasing will be planned and scheduled in a coordination meeting with the Commissioning Authority and the Construction Team and documented within the Commissioning schedule and the Commissioning portion of the master project schedule.

3.10 FUNCTIONAL PERFORMANCE AND INTEGRATED SYSTEMS TESTING

A. The Commissioning Authority will develop, coordinate and witness the Functional Performance and Integrated Systems Test Procedures to be used on the systems being commissioned. The objective of Functional Performance and Integrated Systems Testing is to demonstrate that each system is operating according to the documented basis of design and Contract Documents. Functional Performance and Integrated Systems Testing facilities bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functionality of the system.

B. The Test Procedures will be developed by the Commissioning Authority to reflect operation through all modes (seasonal, occupied, unoccupied, part- and full-load, etc) where there is a specified systems response. Verifying each sequence within the sequence of operations is required. Each contractor associated with any particular system to be commissioned is responsible for providing requested information to the Commissioning Authority to assist in development of the Test Procedures. The Test Procedures will be submitted to the remainder of the Commissioning Team in advance of scheduled Functional Performance and Integrated Systems Testing to give all members of the Commissioning Team time to review the Procedures and make comments or suggest revisions. Each Installing Trade contractor is responsible for reviewing the Test Procedures prior to conducting the testing. Refer to sample Functional Performance Test Procedure at the end of this Section.

C. The Contractor is required to provide all testing instruments and all skilled labor required to conduct the Functional Performance and Integrated Systems Test Procedures. The Commissioning Authority will attend all Functional Performance and Integrated Systems Testing and record all results of the Testing on the Functional Performance and Integrated Systems Test Procedure.

D. Each function and test of the Functional Performance and Integrated Systems Testing shall be performed under conditions that simulate actual conditions as close as is practically possible. The contractor executing the test shall provide all necessary materials, systems modifications, etc. to produce the necessary flows, pressures, temperatures, etc. required to execute the test according to the specified conditions. At completion of the test, the contractor shall return all affected building equipment and systems from these temporary modifications to their pre-test condition.

E. Sampling:

1. Multiple identical pieces of non-life safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference alone does not constitute a

difference. The specific sampling rates associated with each system or type of equipment will be identified within the Commissioning Plan and subsequent commissioning specification sections.

2. A sampling strategy will be used as "XX% Sampling – YY% Failure Rate" defined as:

XX = the percent of the group of identical equipment to be included in each sample.
YY = the percent of the sample that, if failing, will require another sample to be tested.

As an example, a 20% Sampling – 10% Failure Rate will be represented as:

a. Randomly test at least 20% of each group of identical equipment. This 20% constitutes the "first sample".
b. If 10% of the units in the first sample fail the Functional Performance tests, test another 20% of the group (second sample).
c. If 10% of the units in the second sample fail, test all remaining units in the whole group.
d. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Authority may stop the testing and require the responsible contractor to perform and document a checkout of all the remaining units prior to continuing with Functional Performance and Integrated Systems Testing.
e. Costs associated with testing systems beyond the initial sample rate for all parties including the Commissioning Authority are the responsibility of the Construction Team.

F. Pre-requisite documents to be submitted to the Commissioning Authority prior to Functional Performance & Integrated Systems Testing:

1. Updated/Completed Pre-Functional Checklists.
2. Test and Balance Report (preliminary).
3. Contractors' QA/QC Testing Reports.
4. Contractors' Start-Up Reports.
5. O&M Manuals.
6. Trend data from Building Automation Systems points (as identified).

3.11 CORRECTIVE ISSUE REPORT

A. The Commissioning Authority will document deficiencies discovered during Functional Performance and Integrated Systems Testing of systems in a Corrective Issue Report. The Commissioning Authority will then forward this form to the Contractor for action in correcting the deficiency.

B. When the deficiency has been corrected, the Contractor shall note action taken and return the Corrective Issue Report to the Commissioning Authority. Any issues with open resolutions that are not agreed upon between the Contractors and the Commissioning Authority shall be reviewed and commented on by the Engineer Design Team for resolution and ultimately accepted by the Owner's Representative. Reference sample Corrective Issue Report at the end of this Section.

C. Items on the Corrective Issues Report must be completed as a pre-requisite for Substantial Completion.

D. The costs for any re-testing related to deficiencies discovered during Functional Performance and Integrated Systems Testing shall be the responsibility of the Construction Team.

1. The cost to retest a pre-functional or functional test will be back-charged to the Contractor.
2. For a deficiency identified, not related to any pre-functional checklist or start-up fault, the following shall apply: The Commissioning Authority and Contractor will direct the retesting of the equipment once at no "charge" to the trade contractor for their time. However, the Commissioning Authority's time for a second test will be charged to the Contractor, who may choose to recover costs from the responsible sub.
3. The time for the Commissioning Authority to execute any re-testing required because a specific pre-functional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back-charged to the Contractor, who may choose to recover costs from the party responsible for executing the faulty pre-functional test.
4. Any required re-testing shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

3.12 OWNER TRAINING

A. All training sessions shall be coordinated through the Commissioning Authority. The Commissioning Authority will prepare a Training Overview Form for each Training Session required by the Contract Documents and issue to the Contractor. The Training Forms shall be used to schedule, perform and document the required training sessions. Refer to sample form at the end of this Section.

B. Training instructors shall be a Manufacturer's Representative or Applications Engineer fully qualified in the operation, troubleshooting and maintenance procedures for the equipment or systems being covered. Sales Representatives or others possessing only general knowledge of the equipment or the systems will not be acceptable.

C. The Construction Manage/Contractor shall submit a separate Training Form for each training session required by the Contract Documents to the Commissioning Authority. This form shall be submitted a minimum of thirty (30) calendar days in advance of the proposed training session.

D. The Construction Manage/Contractor shall complete the first section of the Overview form including the proposed training session date, name of instructor(s), and proposed length (time) of the session(s). Also, attach an agenda indicating the format of the training session and listing any handouts that will be provided.

E. The Commissioning Authority will review the proposed training information with the Owner's Representative. If the submitted information is complete and the proposed dates meet the Owner's Operations Personnel schedule, the Commissioning Authority will respond to the Construction Manage/Contractor to proceed with scheduling the subject training session.

F. During the training session, the Contractor shall have each attendee sign in the third section of the Training Overview Form. Attach additional pages if necessary. The Construction Manage/Contractor shall then forward the Training Form to the Commissioning Authority.

G. Upon receipt of the Training Overview Form, the Commissioning Authority will have each attendee complete the Evaluation Form to gain feedback on the value of the session.

1. If the session meets the objectives and intent of the Contract Documents, the Commissioning Authority will approve the training form and return to the Contractor for Project Records.

2. If negative feedback is received, the Evaluation Forms will be reviewed with the Commissioning Team and if necessary, re-scheduling of the training may be required.

H. Operations & Maintenance Manuals shall be submitted and approved by the Engineer Design Team and Commissioning Authority BEFORE any training sessions will be scheduled. Any deficiencies identified in the review by the Commissioning Authority will be submitted and coordinated with the Engineer Design Team review. The O&M information will be reviewed and used as reference during training instructions.

3.13 DEFERRED AND/OR SEASONAL TESTING

A. Unforeseen Deferred Testing – If any check or test cannot be completed due to the building structure, phasing, required occupancy condition, or other deficiency, execution of the checklists and Functional Performance and/or Integrated Systems Testing may be delayed upon approval from the Owner's Representative. These tests will be conducted in the same manner as seasonal testing as soon as possible.

B. Seasonal Testing – During the Occupancy Phase, seasonal Functional Performance and/or Integrated Systems Testing (tests delayed until ambient or occupancy conditions are closer to the system's design) shall be completed as part of this contract. The Commissioning Authority shall coordinate this activity in conjunction with the Owner's Representative and the Contractor. Tests will be executed, documented and deficiencies corrected in the same manner as noted for the tests conducted during the Testing and Training Phase. Any final adjustments to the O&M manuals and as-built documents due to this testing are the responsibility of the Contractors.

3.14 TEN MONTH WARRANTY REVIEW MEETING

A. Ten months into the typical twelve-month warranty period, the Commissioning Authority will reconvene the Project Team to meet with the Owner's Representative and other designated Owner's personnel. This meeting is intended to solicit the user comments, suggestions, and areas of concern regarding the systems and their first year of operation. The meeting will include review of any outstanding warranty or punchlist issues for resolution by the Engineer Design Team and/or Construction Team and assignment of responsibility for resolution.

3.15 LESSONS LEARNED SUMMARY

A. After completion of the Functional Performance, Integrated Systems Testing, Owner Training, and Substantial Completion, the Commissioning Authority will compile a Lessons Learned Summary. The purpose of this summary will be to review the project and the Commissioning process. The summary will address concerns, recommendations for improvement, or other concerns aimed at improving the facility and the delivery process. Additionally, opportunity to note and congratulate successes on a well executed project.

3.16 FUNCTIONAL PERFORMANCE TESTING

A. The Commissioning Authority will develop the Functional Performance Test Procedures to be used on the systems being Commissioned. The Test Procedures will be submitted to the Contractor in advance of scheduled Performance Testing to give the Contractor and Trade contractor's time to review the Procedures and make comments or suggest revisions. Reference sample Functional Performance Test Procedure Form at the end of this Section.

B. The Commissioning Authority will oversee and document results of all Functional Performance Testing Procedures required for equipment and systems to be Commissioned.

C. The Contractor is required to provide all testing instruments and all skilled labor required to conduct the Functional Test Procedures. The Commissioning Authority will attend all Functional Test Procedures and record all results of the Testing on the Functional Test Procedure Form.

3.17 COMMISSIONING LIST OF FORMS

A. See following commissioning sections (07 08 00, 08 08 00, 22 08 00, 23 08 00, and 26 08 00) on specific indexes of System and Equipment Forms to be provided.

3.18 COMMISSIONING FORMS AND CHECKLISTS

A. The following forms are provided for reference to be used during the Commissioning Process and will be reviewed, revised, and distributed by the Commissioning Authority. Examples of multiple forms are included at the end of this Section:

1. Commissioning Status Tracking – these are located within each specific Commissioning section
2. Sample Pre-Functional Checklists – these are located within each specific Commissioning section
3. Sample Functional Performance Tests and Integrated Systems Tests – these are located within each specific Commissioning section
4. APPENDIX A - Sample Site Observations Report
5. APPENDIX B - Sample Corrective Issue Report
6. APPENDIX C – Sample Training Form

END OF SECTION 019110

APPENDIX A - Sample Site Observations Report

Project:	GSA San Antonio Hipolito F. Garcia PO-CH Renovation	***Project No.:***	R6W61200
Attendees:	Chris S. Smith (Jacobs)	***Location:***	H F Garcia PO-CH (San Antonio)
Weather:	Cool (50s), Partly Cloudy	***Date:***	11/30/11 – 12/01/11

The following is our understanding of the subject matter covered in this meeting and site visit. If this differs from your understanding, please notify us within five working days.

The purpose of this visit was to:

- Review the construction progress of the facility.
- Review updated construction schedule for impact to Cx activities.
- Verify readiness for functional performance testing activities starting 12/12/11.

On 12/1, a general meeting to discuss the lighting control status and issues determined from the review of the installation and preliminary testing by Kevin Gardner (Jacobs Cx) was held and action items were noted for AJK and Hubbell. The notes from this meeting are more accurately recorded by Beck and Kevin Gardner's site visit report.

During a discussion with Robert Hirsch (Beck), Mike Wiber (Beck), Chris Flores (ABC), and Kenneth Davis (Jacobs) on 12/1, the following dates were determined relating to upcoming Cx activities.

- 3rd Floor Functional Performance Testing
    - Ready for testing starting 12/12.
    - Systems included are AHU-3A, AHU-3B, AHU-6G, and terminal units associated with each AHU. CRAC-2 and CRAC-4 are also included on this floor.
    - Pre-Functional Checklists to be provided to Jacobs by Beck by 12/7.
    - Test & balance report to be available to Jacobs and GSA by 12/12.
- Heating Hot Water System Functional Performance Testing
    - Ready for testing starting 12/12.
    - Pre-Functional Checklists to be provided to Jacobs by Beck by 12/7.
    - Test & balance report to be available to Jacobs and GSA by 12/12.
- JCI and ABC have been confirmed to be available and ready to support Cx functional performance testing during the week of 12/12.
- Additional Cx functional performance testing dates for remaining systems were discussed with Beck and will be reflected in an updated milestone schedule by Beck. Preliminary dates for functional performance testing were determined to be the weeks of 1/23/12, 1/30/12 and 2/20/12.

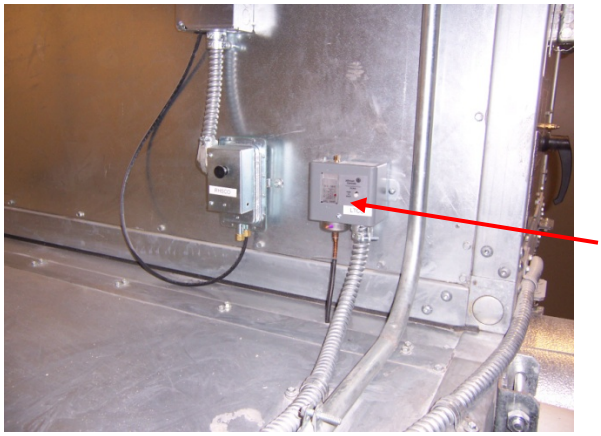
The CxA walked through the facility to review the site construction progress and document any items needed for clarification/correction by the contractor, specifically in relation to the AHUs being installed for each floor. The items noted as issues during this site visit are listed below.

1. No convenience outlets installed in Northeast Mechanical Room on 3rd Floor. Verify not required for future maintenance and operations.

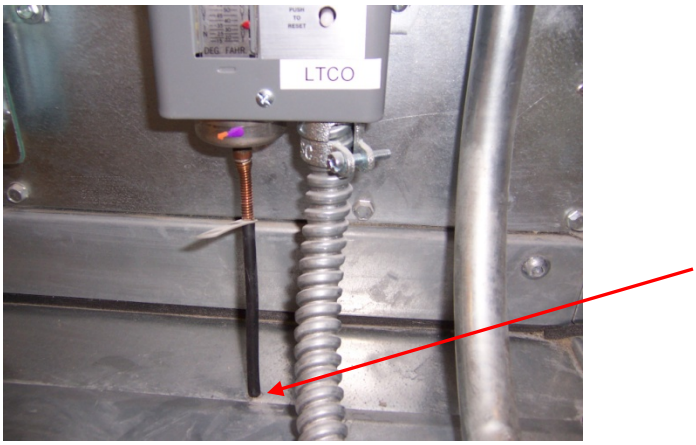
2. No lights installed in filter section of AHUs as required by specifications in AHU-3B.

3. Check mechanical noise at CRAC-2 due to possible dirty filter.

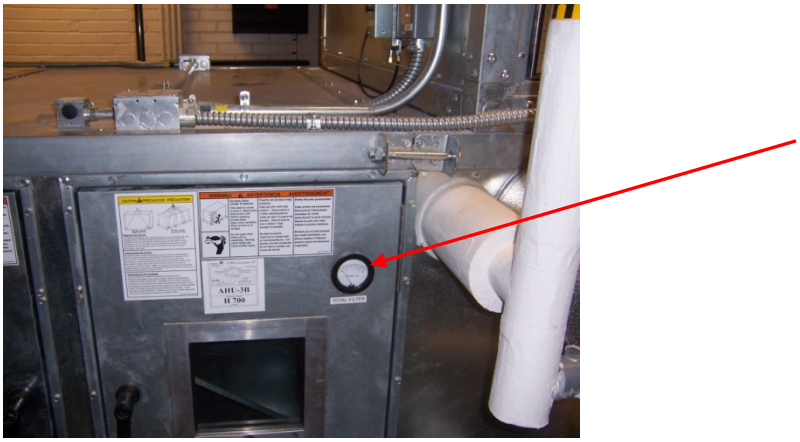
4. Recommend adding label with setpoint to sensors installed on AHUs such as high static, low limit temperature, etc.



5. Seal low limit temperature sensor penetration into AHU-3B.



6. Indicate reason for final filter section to read 0 in w.g. pressure drop on AHU-3B with filters installed and apparently partially obstructed and unit is operating. Verify tubes installed correctly and gauge is accurate.



7. Verify location of AFMS to be installed at ERUs. Sensors not observed installed in ductwork or within ERUs.

8. Controls and sensors not factory mounted in ERUs as required by specifications. Verify all sensors and controllers to be installed as required by specifications and plans (Dwg. MI 1-01).

9. Disconnect not labeled for SS-1A.

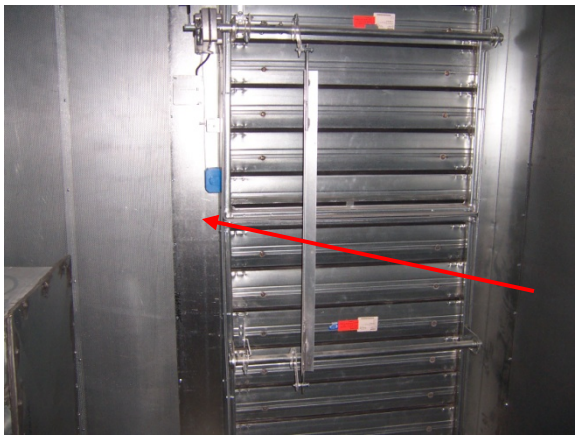
10. Coil damage noted on SS-1A. Verify coil performance and recommend combing out coil fins to assure full capability for heat transfer.

11. Recommend covering VFDs to prevent dust and debris from entering drive cabinet at vents while construction activities are ongoing at AHU-4A and AHU-4B.

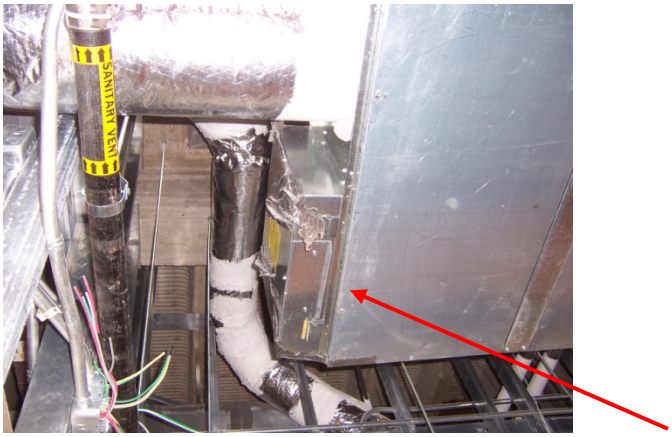
12. Verify no electrical convenience outlet installed in 4th Floor Northwest Mechanical Room. Verify not required for future maintenance and operations.

13. Lights not installed in sections of AHU-4A. Verify to be installed and penetrations for electrical, etc will be sealed as required.

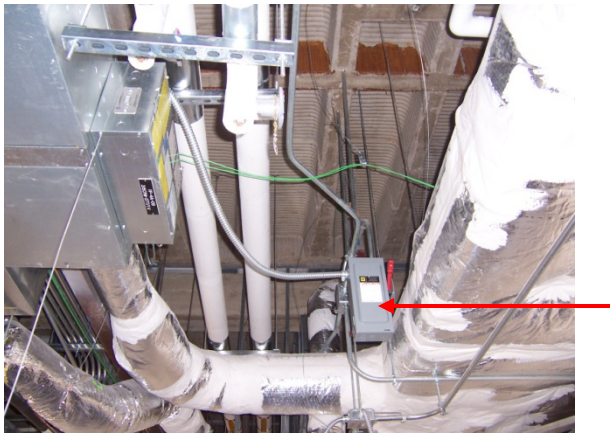
14. Seal around damper perimeter to reduce leakage and maintain adequate outside air control in mixing air section of AHU-4A.



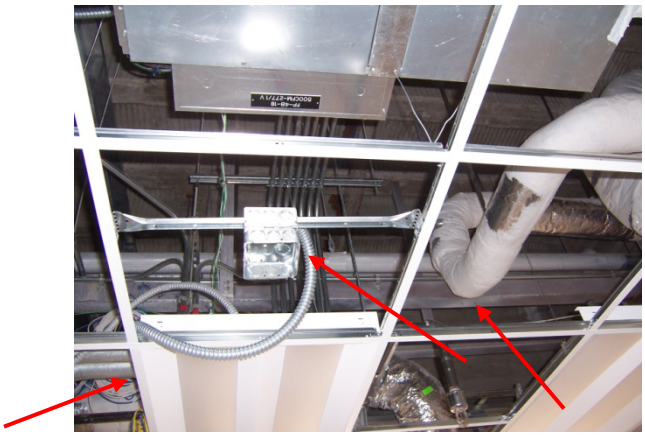
15. Extend plenum air sections at FP-4A-05. Verify full extension will not conflict with other duct, piping, and walls in the vicinity.



16. Label missing on disconnect for FP-4A-09.



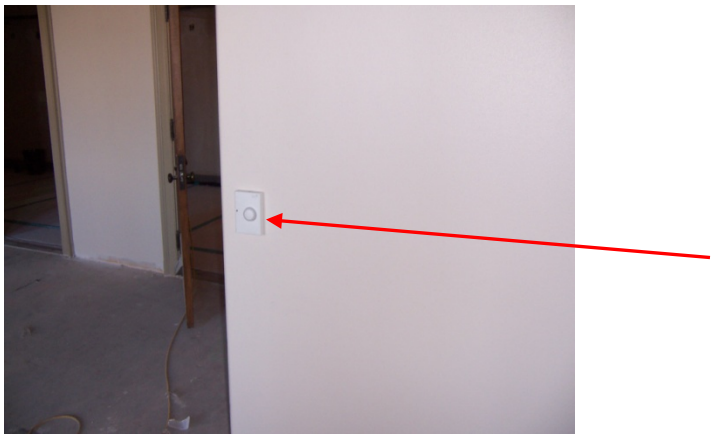
17. Verify adequate access for all construction trades, test & balance activities and future maintenance and operations due to proximity of fire alarm device, lighting fixture, sprinkler piping, etc at FP-4B-18.



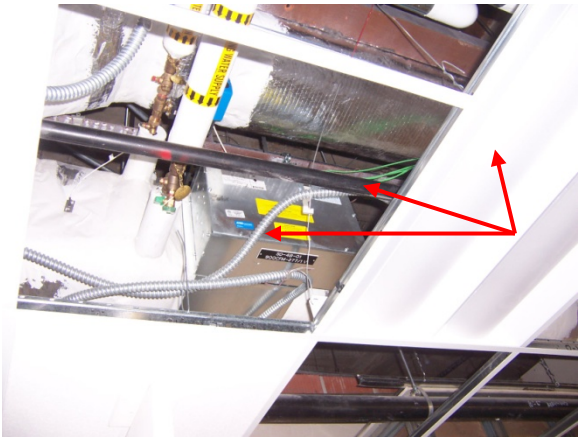
18. Change labels on all SD terminal units to reflect that they are not powered by 277V/1Φ. Units are powered by control power from terminal unit controller.

19. Recommend labeling piping over office near Northeast Mechanical Room on 4th Floor.

20. Recommend covering and protecting t-stats installed on walls while construction activities are on-going on 4th Floor.



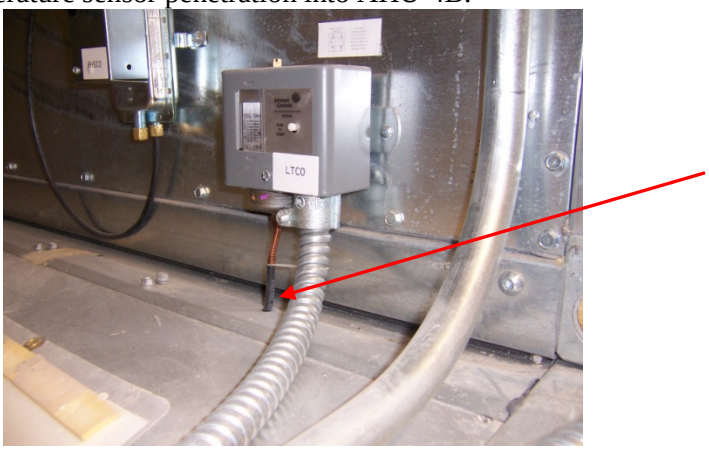
21. Verify adequate access for all construction trades, test & balance activities and future maintenance and operations due to proximity of electrical whips, lighting fixture, sprinkler piping, etc at SD-4B-01.



22. No convenience outlets installed in Northeast Mechanical Room on 4th Floor. Verify not required for future maintenance and operations.

23. No lights installed in filter section of AHUs as required by specifications in AHU-4B.

24. Seal low limit temperature sensor penetration into AHU-4B.



25. Pre-filter section door sticking and does not close and lock completely on AHU-4B. Verify correct alignment and sealing of section.

26. Finish insulation at OA damper in Northeast Mechanical Room at AHU-4B.

27. Access door missing on supply air ductwork immediately downstream of AHU-4B. Cover to prevent dirt and debris from entering ductwork. Verify clean out of duct prior to unit start-up.

Action Items

ITEM	ACTION	RESPONSIBLE PARTY
1.	REVIEW & RESPOND TO ISSUES NOTED DURING CX SITE VISIT.	BECK
2.	COMPLETE & ISSUE PFCS FOR 3RD FLOOR SYSTEMS BY 12/7	BECK
3.	COMPLETE & ISSUE PFCS FOR HEATING HOT WATER SYSTEMS BY 12/7	BECK
4.	TAB REPORTS FOR AHU-3A, AHU-3B, AHU-6G & HEATING HOT WATER SYSTEMS TO BE AVAILABLE ON 12/12	BECK/ABC

If you have any questions or comment, please don't hesitate to contact me.

Reported By: Chris S. Smith, P.E., CxA, LEED AP

APPENDIX B - Sample Corrective Issue Report

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Last Update: 12/08/2011

COMMISSIONING - CORRECTIVE ISSUES REPORT (**CIR**)

Status Legend: **O** = Open **R** = Requires CxA Review/Retest **C** = Closed

Commissioning Agent (CxA)						Responsible Party			CxA	
Item #	**Origin / Test ID**	**Equip ID**	**Date Initiated**	**Initiated By**	**Issue Description**	**Firm / Party**	**Date**	**Response - Action Taken**	**Status**	**Date Closed**
9		AHU-5A, 5B	9/28/10	LR	Possible issues with over pressuring duct due to relief damper and return damper controlling off of different points. Could cause damage to equipment.	Brandt / JCI	9/20/11	Updated JEG (09/29/10): Safety programmed installed in order to not allow the return damper to close below 40% until sequence issue is resolved. Update RLH (02/15/11): Per JCI, this has been Installed per design drawings. Will Jacobs coordinate this change with Goetting? Updated JEG (03/09/11): Should be clarified by PR5 controls changes. Updated JEG (04/24/11): Revised SOO issued addresses this issue. Not yet verified. Update RLH (07/09/11): Per JCI, the new sequence has been implemented. Updated Brandt (8/25/11): PR#5 was issued, priced and approved. The new Control Sequence has now been implemented. Completed 6/13/11.	O	
10		AHU-5A, 5B	9/28/10	LR	Sequence does not allow return air to exhaust from the building during economizer mode, resulting in a positive pressure in the mixed air chamber. This does not allow the use of outside air that is already at an optimal condition.	Brandt / JCI	9/20/11	Updated JEG (09/29/10): Safety programmed installed in order to not allow the return damper to close below 40% until sequence issue is resolved. Update RLH (02/15/11): Per JCI, this has been Installed per design drawings. Will Jacobs coordinate this change with Goetting? Updated JEG (03/09/11): Should be clarified by PR5 controls changes. Updated JEG (04/24/11): Revised SOO issued addresses this issue. Not yet verified. Update RLH (07/09/11): Per JCI, the new sequence has been implemented. Updated Brandt (8/25/11) PR#5 was issued, priced and approved. The new Control Sequence has now been implemented. Completed 6/13/11.	O	

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11		AHU-5A, 5B	9/29/10	LR	Economizer mode lacks low limit range at which to exit economizer program.	Brandt / JCI	9/20/11	Updated JEG (09/29/10): If a low limit is not programmed for the economizer mode the system is more prone to low temperature alarms due to added amount of outside air. . Update RLH (02/15/11): No response from Brandt and/or JCI on this issue. Updated JEG (03/09/11): Should be clarified by PR5 controls changes. Updated JEG (04/24/11) A revised SOO was issued to change the economizer mode enable with an OA enthalpy of less than 29 BTU/lb. The dampers modulating to maintain a mixed air temp of 55˚F. Not verified. Update RLH (07/09/11): Per JCI, the new sequence has been implemented. Updated Brandt (8/25/11) PR#5 was issued, priced and approved. The new Control Sequence has now been implemented. Completed 6/13/11.	O	
17		AHU-5A, 5B	9/29/10	LR	Smoke detector only located in supply duct work. Sequence calls for detectors in both supply and return duct.	AJK	9/20/11	Updated JEG (09/29/10): FA series drawings illustrate smoke detectors ONLY in supply air ductwork. Sequences should be corrected by design engineer to reflect the FA device information. Goetting to adjust sequences based on FA drawings. Update RLH (02/15/11): This has been Installed per Fire Alarm design drawings. Will Jacobs coordinate this change with Goetting? Update JEG (03/09/11): Request Goetting to review and answer. Goetting response: The original bid set had higher CFMs for AHU_5A, 5B which required supply air smoke detectors. The units now are below the requirements for supply air smoke detectors. The smoke detectors are still required in the return air. Update RLH (07/09/11): Beck has not received official direction from the GSA Fire Marshal (Rahe Loftin) to change from the work illustrated on the FA drawings. The GSA Fire Marshal predicates the location of fire alarm devices on this project. Update RLH (09/20/11): This issue has been closed since 03/09/11, remove this outstanding item from the CIR.	O	

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24		All Units	9/29/10	KG	Daylight Sensors / Dimming Controls do not provide occupant dimming control as required by Specification 16500, Paragraphs 2.5 C.9 through 11, and 2.5 D.9 through 10.	AJK	9/20/11	Update RLH (12/06/10): A meeting was held on the 2nd of November to address the design and current installation of the lighting controls system. The installation of the correct controller, adjustments in the system and daylight sensor in the corridor is pending the delivery of the remote control for setup of the sensors. Adjustment will be followed by Jacobs commissioning retesting the systems. Update RLH (02/15/11): Close Office devices were installed 01/17/11 and programming was completed on 01/25/11. This item is ready for Jacobs Commissioning verification. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): Consulting with Hubbell. Lighting controls should be ready for review during 10/10/11 commissioning site visit.	O	
25		Rms 569, 569B, 577A, 587	9/30/10	KG	Daylight Sensor / Dimming Controls in spot checked areas do not automatically adjust artificial lighting levels to automatically compensate for different levels of natural ambient daylight. Photo sensors and dimming controls reported not yet set-up and adjusted. Local vendor representative indicated that dimming controls were not planned to be set-up, adjusted and commissioned until end of project, rather than on phased floor-by-floor basis.	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/06/10): Setup scheduled with main Lighting Control System. AJ Kirkwood is working with Hubbell to provide setup and project training for 5th floor to avoid waiting until the end of the project. AJ Kirkwood would then complete the setup of these open office units for the remainder of the project. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): Consulting with Hubbell. Lighting controls should be ready for review during 10/10/11 commissioning site visit.	O	

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26		Rms 569, 587	10/1/10	KG	In open office areas with user adjustable dimming controls on walls, manual adjustment of illumination level was not able to be automatically maintained by dimming control system when ambient illumination changed – as specified Section 16500, Paragraph 2.5 C.10. It is possible that the dimming controls may not have been set-up, yet to perform the required function.	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/06/10): See item 25. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): Consulting with Hubbell. Lighting controls should be ready for review during 10/10/11 commissioning site visit.	O	
27		Rms 569, 587	9/30/10	KG	In open office areas, it was not possible to place occupancy sensors in “walk test” mode described in installation documentation with reduced occupancy sensor timeout, to verify occupancy sensor operation. It is possible that the equipment set-up has not been completed for occupancy sensor and dimming control interface.	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/06/10): See item 25. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): Consulting with Hubbell. Lighting controls should be ready for review during 10/10/11 commissioning site visit.	O	
28		Rms 587	9/30/10	KG	Multizone dimming controls in open office areas not balanced to achieve uniform illumination levels. In room 587, lights in outer row along windows were noticeably brighter than interior row farther away from windows. Reverse condition should have been the case.	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/06/10): See item 25. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): Consulting with Hubbell. Lighting controls should be ready for review during 10/10/11 commissioning site visit.	O	

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29		Corridor 580	10/1/10	KG	Daylight Harvesting in Corridor 580 by photocell switching not installed.	AJK	9/20/11	Updated JEG (10/01/10): There may be confusion regarding interpretation of answer to RFI 0106. Answer appears to indicate that fixtures that were called to be dim controlled shall instead be on/off controlled by the photo sensors, instead of continuously dimmed. Contractor appears to have interpreted the answer as not requiring photo control of lights, and as connected, the corridor lights in affected area are controlled only from time basis by LCP. AJK to clarify intent of RFI response with design team. Update RLH (12/06/10): See Item 24. Update RLH (02/06/10): The photocell was installed on 01/17/11; AJ Kirkwood is working with Hubbell to provide setup of this unit to avoid waiting until the end of the project. AJ Kirkwood would then complete the setup of these devices for the remainder of the corridors. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): This is associated with the lighting control panels, and these cannot be completed until all are installed in the building. Once all panels are installed, all components will be programmed and set-up for control.	O	
30		Suites 533, 545	9/29/10	KG	AJK installer indicated that all occupancy sensors have been installed with minimum occupancy hold time of 8 minutes, but tested occupancy sensors in Suite Rooms 533B through 545B varied considerably from 9 minute hold time to 30 minutes hold time at that setting (except Rooms 533E – which was not tested due to inability to initially turn off light at beginning of test, and Room 533G – which failed to turn off lights within 40 minutes of activation during test). Sensors installed are adaptive,	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/06/10): See item 25. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): Consulting with Hubbell. Lighting controls should be ready for review during 10/10/11 commissioning site visit.	O	

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					and it is possible that sensors installed may not have been set-up as installer believed with fixed hold time.					
31		All Rooms w/Dimming Controls	9/29/10	KG	Dimming controls provided do not appear to be capable of 2 set points (day & night), as required per Section 16500, Paragraph 2.5 C.8.	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/15/11): Close Office devices were installed 01/17/11 and programming was completed on 01/25/11. This item is ready for Jacobs Commissioning verification. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): No change, ready for review.	O	
32		All Rooms w/Occupancy Sensors	9/30/10	KG	Bypass manual override feature specified in Section 16500, Paragraph 2.5 F.19 does not appear to have been provided for occupancy sensors.	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/15/11): Per AJ Kirkwood, this sensor is capable of this feature. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): No change, ready for review.	O	
33		Open Offices in 593, 597	9/30/10	KG	Occupancy Sensors and dimming systems in Suites 593 and 597 were still being troubleshot be installers, and were not operational.	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/06/10): This is now operational. Setup scheduled with main Lighting Control System. AJ Kirkwood is working with Hubbell to provide setup and project training for 5th floor to avoid waiting until the end of the project. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): Consulting with Hubbell. Lighting controls should be ready for review during 10/10/11 commissioning site visit.	O	

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Item #	**Origin / Test ID**	**Equip ID**	**Date Initiated**	**Initiated By**	**Issue Description**	**Firm / Party**	**Date**	**Response - Action Taken**	**Status**	**Date Closed**
34		Suite 563	9/30/10	KG	Could not access Congress Office Suite 563, so could not perform any tests or verifications in that area.		3/9/11	Update RLH (02/06/10): Not sure what is to be addressed in this space. Updated JEG (03/09/11): Being used for test tracking purposes.	O	
35		Room 590	9/30/10	KG	Could not access room due to new floor installed, so could not perform tests or verifications.		3/9/11	Update RLH (02/06/10): Not sure what is to be addressed in this space. Updated JEG (03/09/11): Being used for test tracking purposes.	O	
36		Room 577A	9/30/10	KG	Ultrasonic ceiling mounted occupancy sensor installed, but Dual Technology sensor is indicated on submittal drawing. Also, tester could walk around entire perimeter of office without activating occupancy sensor. Verify that single sensor in this area will meet specified 90-100% coverage in room.	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/15/11): Per AJ Kirkwood, this item is complete and ready for Jacobs Commissioning verification. Update JEG (03/09/11): Has sensor been changed? Update RLH (03-21-11): Per email from AJ Kirkwood, the sensor installed is a dual technology model. To be confirmed during next visit. Update AJ Kirkwood (09/20/11): No change, ready for review.	O	
37		Room 555C	9/30/10	KG	Ceiling mounted occupancy sensor was able to operate lights, but tester was able to walk across room twice at far end away from sensor before detection. Verify that single sensor in this area will meet specified 90-100% coverage in room.	AJK	9/20/11	Update RLH (12/06/10): See Item 24. Update RLH (02/15/11): Per AJ Kirkwood, this item is complete and ready for Jacobs Commissioning verification. Updated JEG (03/09/11): To be reviewed at time of next testing for lighting controls. Update AJ Kirkwood (09/20/11): No change, ready for review.	O	

APPENDIX C - Sample Training Form

OPERATIONS AND MAINTENANCE TRAINING

Contractor Training Requirements and Form

Training Plan [M-01]	**[Equipment Type]**	Specifications [XXXXXX]

Contractor Training Requirements:

Contractors are required to provide training on equipment and systems as identified in the contract documents The contractor is to provide to the Department of Veterans Affairs Resident Engineer and the Commissioning Authority (CxA) the following documentation:

- ***Instructor Qualifications / Resume***
- ***Training Agenda / Outline***
- ***Copies of all handouts / documents that will be provided during the instruction***

The Contractor is to complete the Contractor Training Plan Submittal Form, as a checklist to ensure the above items are provided, to the Commissioning Authority for review and comment by both the Owners Representative and the Commissioning Authority.

The Contractor's Instructor is responsible, during the delivery of the training, to ensure that all attendees sign into the training on the Class Attendance Roster. Once completed, the sign in sheet will be forwarded to the Cx Authority (CxA) and Department of Veterans Affairs Resident Engineer for their records.

Contractor Training Plan Submittal Form:

Training Plan (Contractor Provides) Includes: ☐ Instructor Qualifications/Resume' ☐ Agenda / Training Outline ☐ Handouts / Documents	**Training Conducted by**: **Instructor Name**: **Title**: **Phone**: **FAX**: **Email:**
Equipment Included in Training: [List each piece of equipment (AHU-1, AHU-2…..)]	

Agenda Topics:
The following syllabi points shall be included as a minimum:

[EDIT THE FOLLOWING USING EXAMPLES GIVEN:]

	TOPIC	LOCATION	TIME	PRESENTER
I.	Overall Design Intent Air Handling Systems	Classroom	8 am – 10:30 am 11 am- Noon	Karpinski Engineers
II	Break	Classroom	10:30 – 11:00	
III	Custom Air Handling Units (AHU-3 – AHU-8)	Classroom	Lunch 1:00pm – 4:30	Custom Air Handling Provider (Factory Trainer) BAS Provider

A. Review General Unit Operation / Components / Performance including fans, motors, coils, filters, dampers, airflow stations, VFC's, humidifiers, and other components operation with load and methods of control
B. Describe supply and return fans and required monitoring, maintenance and service including replacement of belts and sheaves, motors, and regular monthly maintenance
C. Review all coil installations and ongoing cleaning and maintenance
D. Review all Electrical Components including wiring diagrams, all safety interlocks, VFC'S wiring, performance and regular monitoring and maintenance
E. Describe unit Operator Interface and Controls, Control Points, Interface with main Operator Work Station. Describe use of the Operator Interface Panel. Describe use of VFC operator interface panels
F. Review procedures for filter replacement
G. Review all Alarms and Troubleshooting of alarms
    a. Types of Alarms and Meaning of alarm and actions required by maintenance depending upon the alarm
    b. Responses to different types of alarms
H. Review operation and maintenance of AHU humidifiers
I. Review operation and maintenance of damper actuators and control valve actuators and dampers and control valves
J. Review Daily, Monthly, and Annual Maintenance

Contractor Training Class Attendance Roster &
Owner / Commissioning Authority Training Evaluation Form:

Training Plan [M-01]	**[Equipment Type]**	Specifications [XXXXXX]
Instructor Name:		**Date & Time of Training**:
Each Attendee to print name and title:		
Printed Name:		**Job Title:**
Comments:		

SECTION 02 22 26 – DUCT BANK ASSESSMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Inspection of all existing duct bank conduits using color closed circuit television (CCTV) camera, and document the record of the inspection in DVD format with audio location and date information, video title information, continuous tape counter and provide paper and digital copies of all inspection logs. Television inspection shall be made following connections to new manholes.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Television Inspection Camera(s): Equipped with rotating head, capable of ± 275-degree rotation from horizontal and 360-degree rotation about its centerline.

1. Minimum Camera Resolution: 400 vertical lines and 460 horizontal lines, picture quality and definition shall be to the satisfaction of the Engineer.

2. Camera Lens: Not less than 140 degree viewing angle, with automatic or remote focus and iris controls.

3. Focal Distance: Adjustable through range of 6 inches to infinity.

4. Camera(s) shall be intrinsically safe and operative in 100 percent humidity conditions.

5. Lighting Intensity: Remote-controlled and adjusted to minimize reflective glare.

6. Lighting and Camera Quality: Provide clear, in-focus picture of entire inside periphery of sewer. A reflector in front of the camera may be required to enhance lighting in large diameter pipe.

7. Height adjustment: Use a camera with camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe.

B. Footage Counter: Measures distance traveled by camera from the centerline of the starting manhole, accurate to two-tenths of a foot over the entire length of the section being inspected.

C. Video Titling: Video equipment shall include genlocking capabilities to extent that computer generated data (such as footage, date, and size) as determined by SDR, can be overlaid onto video, and be indicated on television monitor and permanently recorded on inspection videotape.

D. Recording: All recordings are to be in digital format.

1. Image Capture: Capture color still shots of video recordings for all defects encountered. Digitized picture images shall be stored and be exportable as JPEG formats.

2. Video Capture: Full time live video and audio files shall be captured for each pipe segment and lateral inspected. The files shall be stored in industry standard MPEG format viewable from a DVD on an external personal computer that utilizes Microsoft Media Player, version 9.0 to view the recording. The MPEG video shall be ISO-MPEG Level 1 (MPEG-1) coding with a resolution of 352 pixels (x) by 240 pixels (y) and an encoded frame rate of 29.97 frames per second. System shall perform an automatic disk image/file naming structure to allow saved video/data sections to be "burned" to DVDR format. It shall have the capability of "burning" a minimum of 120 minutes of recording to the DVDR media. The video recording shall be free of electrical interference and shall produce a clear and stable image. The audio recording shall be sufficiently free of background and electrical noise as to produce an oral report that is clear and discernable. The digital recordings and inspection data shall be cross-referenced to allow instant access to any point of interest within the digital recording

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. The Trade Contractor shall provide qualified and experienced personnel and all necessary equipment, tools and materials and all incidentals required to perform Television Inspection according to the requirements of this specification.

B. SUBMITTALS

1. DVD and inspection logs will be reviewed to determine if quality of CCTV image is acceptable, and if defects were properly identified and documented.

2. Modify equipment and/or inspection procedures to achieve report material of acceptable quality.

3. Do not commence work prior to approval of report material quality by the Engineer Upon acceptance; report material shall serve as standard for remaining work.

4. Maintain copy of all inspection documentation (tapes, databases, and logs) for duration of work and warranty period.

C. LEGAL, HEALTH AND SAFETY REQUIREMENTS

The Trade Contractor shall observe all federal, state and local laws, ordinances, policies, practices and regulations. In addition, the Trade Contractor agrees to promptly procure all necessary approvals, licenses and permits, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work.

The Trade Contractor shall conduct the work at all times in such a manner as to insure the least possible obstruction to traffic. The convenience of the general public and of the residents along and adjacent to the roadway shall be provided for in an adequate and satisfactory manner as the Engineer may direct.

All equipment and Materials shall be placed or stored in such locations so as not to be or to create the danger of becoming a hazard to the traveling public. No section of road shall be closed to the public except by permission of the City of New Haven.

The safety provisions of applicable laws, building, construction and fire safety codes and the latest edition of the "Construction Safety Code, State of Connecticut, Labor Department", approved by the State Labor Commissioner, shall be complied with at all times.

The Trade Contractor shall obtain the appropriate permits and approvals Perform operations in strict accordance with OSHA and equipment manufacturers' safety requirements. Particular attention is drawn to safety requirements involving entering confined spaces.

D. ACCEPTANCE BY THE ENGINEER

Final Acceptance of the work shall be determined by the Engineer based upon the verification that the sanitary sewer television inspection has been successfully completed in accordance with this specification. If the Engineer determines that the television inspection has not been completed in accordance with this specification, the Trade Contractor shall repeat the television inspection process until final acceptance is obtained. Cost to repeat the television inspection shall be the responsibility of the Trade Contractor.

END OF SECTION 02 22 26

SECTION 02 41 13 – SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Demolition of site elements specified on the plans or as ordered and in conformity with these specifications.

B. Description of work: The removal and disposal of: concrete sidewalk, concrete pavement, concrete curbing, granite curbing, concrete pump station, concrete piles, concrete pile caps, concrete foundations, concrete footings, concrete stairs, concrete duct banks with the associated wires conduits all concrete reinforcing, existing chain link fencing and bituminous type pavement is included in this item.

1.2 RELATED REQUIREMENTS

A. Section 31 23 16.13 Trenching

B. Section 31 23 23 Fill

PART 2 PRODUCTS

2.1 MATERIALS

A. The material for backfill shall meet the requirements of compacted granular fill in Section 31 23 23.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that area for demolition as indicated on the plans is ready for the Work as indicated.

3.2 PREPARATION

A. Layout the location of the limits for items to be removed indicated on the plans for elements to be removed prior to demolition.

3.3 DEMOLITION

A. Concrete Sidewalk: Limits of concrete sidewalk removal shall be made to the nearest expansion or construction joint. Limit of removal shall be made with a neat and clean saw cut of the existing sidewalk.

B. Concrete Pavement: Limits of concrete pavement removal shall be made to the nearest expansion or construction joint. Limit of removal shall be made with a neat and clean saw cut of the existing pavement.

C. Granite Stone Curbing: Limits of granite stone curbing removal shall be made with a neat and clean saw cut of the existing curbing. The ends of granite stone curbing that are to remain without new curbing constructed adjacent to it will be cut at a bevel as directed by the Engineer. Granite stone curbing shall remain the property of the owner unless otherwise specifically released to the contractor. Granite stone curbing specifically released to the contractor shall be removed from the site and properly disposed of.

D. Concrete Curbing: Limits of concrete curbing removal shall be made with a neat and clean saw cut of the existing curbing. The ends of concrete curbing that are to remain without new curbing constructed adjacent to it will be cut at a bevel as directed by the Engineer.

E. Concrete Pump Station: The remains of the concrete vault that housed the existing sanitary lift station shall be removed in its entirety and backfilled with compacted granular fill.

F. Concrete Piles: The remains of concrete piles shall be removed to a point 2’ below proposed utility and site element installations and backfilled with compacted granular fill. Reinforcing bar shall be cut neatly to the top surface of the remaining pile as directed by the Engineer.

G. Concrete Pile Caps: The remains of concrete pile caps shall be removed to a point 2’ below proposed utility and site element installations and backfilled with compacted granular fill. Reinforcing bar shall be cut neatly to the top surface of the remaining pile as directed by the Engineer.

H. Concrete Footings: The remains of concrete footings shall be removed to a point 2’ below proposed utility and site element installations and backfilled with compacted granular fill. Reinforcing bar shall be cut neatly to the surface of the remaining footing as directed by the Engineer.

I. Concrete Foundations: The remains of concrete foundations shall be removed to a point 2’ below proposed utility and site element installations and backfilled with compacted granular fill. Reinforcing bar shall be cut neatly to the surface of the remaining foundation as directed by the Engineer. Remaining insulation, shall be removed in its entirety as directed by the Engineer.

K. Concrete Stairs: The remains of concrete stairs shall be removed in their entirety and backfilled with compacted granular fill.

L. Concrete Duct Banks: The remains of concrete duct banks shall be removed in their entirety along with cabling and backfilled with compacted granular fill to the limits indicated on the

plans. The ends of the duct banks shall be capped as directed by the Engineer. Reinforcing bar shall be cut neatly to the surface of the remaining footing as directed by the Engineer.

M. Removal of Bituminous Type Pavement: Limits of bituminous type pavement shall be made to the limits specified on the plans or as directed by the Engineer. Limit of removal shall be made with a neat and clean saw cut of the existing pavement.

3.4 CONSTRUCTION METHODS

A. The Trade Contractor shall remove and dispose of materials from the project site, unless otherwise specified by this specification or as directed by engineer

B. Disposal of materials shall be done in a manner which meets local and federal regulations.

END OF SECTION 02 41 13

SECTION 02 41 13.23 – UTILITY LINE REMOVAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Demolition and removal of site utilities and associated accessories.

1.2 RELATED REQUIREMENTS

A. Section 31 23 16.13 Trenching

B. Section 31 23 23 Fill

PART 2 PRODUCTS

2.1 MATERIALS

A. The material for backfill shall meet the requirements of compacted granular fill in Section 31 23 23:

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that area for demolition indicated on the plans is ready for the Work as indicated.

3.2 PREPARATION

A. Layout the location of the limits for items to be removed indicated on the plans for elements to be removed prior to demolition.

B. Coordinate with utility companies and obtain permits necessary for the cut and capping of utility lines.

3.3 DEMOLITION

A. Utility Piping: Limits of utility line removal shall be made to the limits depicted on the plans. Limit of removal shall be made with a neat and clean saw cut of the pipe the pipe shall be capped per utility company requirements.

B. Utility Storm Drainage Piping: Limits of utility storm drainage piping removal shall be made to the limits shown on the plans. Limit of removal shall be made with a neat and clean saw cut of the pipe and the pipe shall be plugged where indicated on the plan or as directed by the CTDOT PM

C. Utility Structures: Utility structures shall be removed in their entirety where indicated on the plans or as directed by the CTDOT PM.

D. Utility Drainage Structures: Utility drainage structures shall be removed in their entirety where indicated on the plans or as directed by the CTDOT PM.

END OF SECTION 02 41 13.23

SECTION 02 41 13.33 – RAILTRACK REMOVAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of turnouts, rail, ties, rail guard rail, and all appurtenances beyond installation limits and new work limits shown on the Contract Drawings in order to meet minimum rail length requirements for both track and turnouts, and all other track materials and appurtenances; all power and signal materials and appurtenances, (cable, wire, conduit, trunking, track connections, rail bonding, and other appurtenances secured to the ties or rails) that are in the trackway which will be required to be removed in order to provide for the changes in the tracks within the limits shown on the Contract Drawings and as determined by the CTDOT PM; also all cleaning up, including the removal and disposal of all debris and incidental work. Ballast shall be removed under Earth Excavation. Railroad ties shall be removed under the Selective Demolition item. Concrete shall be removed under the Rock Excavation item. Contaminated railroad ties shall be disposed under the Transportation and Disposal of Contaminated Railroad Ties item.

1.2 SUBMITTALS

A. See Section 01 33 00 SUBMITTAL PROCEDURES and Section 01 33 00.13 – DOCUMENT CONTROL, for submittal requirements for this work.

1.3 RELATED REQUIREMENTS

A. 02 41 13 Selective Site Demolition, for demolition of any item not specified below in related requirements.

B. Section 31 23 16 Excavation, for excavation.

C. Section 31 23 23 Fill, for backfill material.

PART 2 PRODUCTS

2.1 MATERIALS

A. The Trade Contractor shall comply with provisions of Codes, Specifications, Standards and recommended practices of the most recent edition and addenda thereto of:

AREMA Manual: American Railway Engineering and Maintenance of Way Association, Manual for Railway Engineering.

MNRR: Metro North Railroad

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify the area for demolition indicated on the plans is ready for work as indicated.

3.2 CONSTRUCTION

A. The Trade Contractor shall remove tracks at such time and under such conditions as has been approved by the CTDOT PM prior to the start of such work.

B. Rails shall be cut at the limit of removal using a rail saw and not with a torch. Demolition and removal of work shall be carried out in a systematic manner, with the least possible disturbance to existing traffic on adjacent tracks. Trackwork removal shall include all rails, ties concrete and hardware.

C. The Trade Contractor shall remove and collect certain track materials not required for reinstallation, from existing track shown on the Contract Drawings. These Materials shall remain the property of ConnDOT and the Trade Contractor shall deliver these materials to the ConnDOT material storage yard as directed by the CTDOT PM.

D. Except where otherwise shown on the Contract Drawings or directed by the CTDOT PM, materials to be removed and collected by the Trade Contractor for return to ConnDOT shall include:

1. All in-service rails, frogs, switch points and stock rails in good condition as determined by the CTDOT PM.

2. All hand thrown switch stands.

E. All cross ties and switch ties to be removed by the Trade Contractor shall be transported to the waste stockpile area for environmental testing by others. Disposal of the tested ties determined to be contaminated shall not be covered under this item but shall be covered under the item Disposal of Contaminated Railroad Ties. Railroad ties determined not to be contaminated shall be disposed of under the item Earth Excavation.

END OF SECTION 02 41 13.33

SECTION 02 41 19.01 – REMOVE POLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The removal of existing utility poles and foundations at the locations shown on the plans or as directed by the CTDOT PM.

B. Removal of aerial cable, guy wires, guy anchors, and associated equipment as indicated on the plans or as directed by the CTDOT PM.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. If removal of a pole designated in the Contract could result in the instability of an adjacent pole, an appropriate stabilization device (back guy or brace with reflective sleeve to height of 8’ above ground) shall be installed before removing the designated pole. All stabilization devices shall be approved by the CTDOT PM.

B. The Contractor shall remove pole, aerial cable and associated equipment where required.

C. The removed aerial cable shall be neatly coiled and tied upon removal and disposed of by the Contractor.

D. Wood poles shall remain the property of the Owner unless otherwise specifically released to the Contractor. All wood poles specifically released to the Contractor as well as other poles and aerial cable and associated equipment shall remain the property of the Contractor and shall be removed from the site and disposed of properly.

E. The Contractor shall coordinate with the Owner to determine the storage facility where the salvageable materials are to be delivered. The Contractor shall contact the owner at least 24 hours in advance to coordinate unloading and storage.

F. The Contractor shall load, transport, and unload the material. The material shall be stacked and stored according to the directions of the Materials Storage Manager. The condition of the material is to be determined by the State Inspector responsible for this project. Strict adherence to proper stores documentation, Directive 19 - "Transfer of Salvage Material from Project to Stores", is mandatory. Any material not meeting these criteria will be refused.

G. The Contractor shall be responsible for damage to all equipment and material incurred during removal and hauling to specified area. All repairs or replacements due to damage or loss by the Contractor shall be made at the Contractor's expense.

H. The Contractor shall: Remove and properly dispose of all wood poles specifically released to the Contractor as well as other poles; Remove and properly dispose of concrete pole foundations; Backfill voids left by removal of the poles and foundations. Backfill material shall be a granular fill compacted to density equal to the surrounding soil. Pole foundations shall be removed to a minimum of three feet below finished grade or as directed by the CTDOT PM.

END OF SECTION 02 41 19.01

SECTION 02 67 00 – REMOVAL AND DISPOSAL OF CONTAMINATED RAILROAD TIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work under this item shall consist of the loading, transportation and final off-site treatment/recycling/disposal of Contaminated Railroad Ties (excluding concrete) which may be generated from various excavations within the Project Limits and determined to be contaminated with regulated substances at non-hazardous levels. Such railroad ties, after proper characterization by the Engineer, shall be reduced to sections of four (4) feet or less in length, loaded into dump trailers or roll-off boxes, transported to, and treated/recycled/disposed at a permitted treatment/recycle/disposal facility listed herein.

1.2 RELATED REQUIREMENTS

A. Section 31 23 16 Excavation

B. Section 31 23 23 Fill

1.3 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures and Section 01 33 00.13 – Document Control for submittal procedures, except as modified herein.

B. The Trade Contractor shall submit in writing, within fourteen days (14) days after Bid opening:

1. A letter listing the names of the treatment/recycle/disposal facilities (from the list below), which the bidder, if it is awarded the Contract, will use to receive contaminated railroad ties from this Project;

2. A copy of the attached "Disposal Facility Material Acceptance Certification" form in sub-article 2.2 from each facility, which shall be signed by an authorized representative of each treatment/recycle/disposal facility; and

3. A copy of the facility acceptance criteria and facility sampling frequency requirements from each facility.

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 Trade Contractor's submittal without the Engineer's prior approval. If the material cannot be accepted by any of the Trade Contractor's designated facilities, the Department will supply the Trade Contractor with the name(s) of other acceptable facilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill material shall be compacted granular fill and conform to the requirements of Section 31 23 23 Fill.

2.2 APPROVED DISPOSAL FACILITIES

A. The Trade Contractor shall use one or more of the following Department-approved treatment/recycle/disposal facilities for the disposal of non-hazardous Contaminated Railroad Ties:

Allied Waste Niagara Falls Landfill, LLC Attn: Eugene Lunney 5600 Niagara Falls Boulevard Niagara, NY 14304 Phone: (781) 560-1379 Fax: (716) 285-3398	Environmental Quality Company Wayne Disposal Facility Attn: Mara Poe 49350 North I-94 Service Drive Belleville, MI 48111 Phone: (734) 697-2200 Fax: (734) 699-3499
Waste Management of New Hampshire Attn: Brian Dexter 90 Rochester Neck Road P.O. Box 7065 Rochester, NH 03839 Phone: (603) 330-2197 Fax: (603) 330-2130	Republic Environmental Systems Attn: Julie James 2869 Sandstone Drive Hatfield, PA 19440 Phone: (215) 822-2676 Fax: (215) 822-1293
Mostoller Landfill Interstate Waste Services Attn: Don Demkovitz 7095 Glades Pike Summerset, PA 15501 Phone: (717) 729-2060 Fax: (814) 444-0127	Ontario County Landfill Casella Waste Attn: Scott Sampson 3555 Farm Road Stanley, NY 14561 Phone: (603) 235-3597 Fax: (585) 526-5459

Disposal Facility Materials Acceptance Certification

Project Number _____

Project Location_____

Facility Name_____ Telephone_____

Facility Address_____ Fax_____

_____

_____

The Trade Contractor has supplied the required analytical data which I have personally reviewed and intend to accept the following:

Contaminated materials as described in Section 02 67 00, "Removal and Disposal of Contaminated Railroad Ties" for the subject Project.

This intent to accept the material will be subject to and dependent upon the facility's subsequent evaluation of waste characterization determination documentation to be provided to the Trade Contractor by the Engineer.

Authorized Facility

Representative_____/_____

Printed/Typed Name Title

_____/_____

Signature Date

Note: The facility shall attach the acceptance criteria and facility sampling frequency requirements to this document.

DO NOT ALTER FORM IN ANY WAY. FORM MUST BE COMPLETED IN ENTIRETY.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. **Excavation:** Excavation shall be made to the required depths or as directed. All railroad tie material shall be removed and replaced with suitable material.

B. **Backfill Material:** The provisions of Section 31 23 23 Fill, compacted granular fill, shall apply.

C. **Material Disposal:** The Trade Contractor shall obtain and complete all paperwork necessary to arrange for material disposal (such as disposal facility waste profile sheets). It is solely the Trade Contractor's responsibility to coordinate the disposal of Contaminated Railroad Ties with its selected treatment/recycling/disposal facility(s). Upon receipt of the final approval from the facility, the Trade Contractor shall arrange for the loading, transport and disposal of the Contaminated Railroad Ties in accordance with all federal and state regulations. **No claim will be considered based on the failure of the Trade Contractor's selected disposal facility(s) to meet the Trade Contractor's production rate or for the Trade Contractor's failure to select sufficient facilities to meet its production rate.**

The Engineer will sample the Contaminated Railroad Ties at a frequency established by the selected disposal facility. The Trade Contractor shall designate to the Engineer which facility it intends to use prior to samples being taken. The Trade Contractor is hereby notified that laboratory turnaround time is expected to be fifteen (15) working days. Turnaround time is the period of time beginning when the Trade Contractor notifies the Engineer which facility it intends to use and that the Contaminated Railroad Ties are ready for sampling, and ending with the Trade Contractor's receipt of the laboratory analytical results. Any change of intended disposal facility may prompt the need to resample and will therefore restart the time required for laboratory turnaround. The laboratory will furnish such results to the Engineer. Upon receipt, the Engineer will make available to the Trade Contractor the results of the final waste characterization determinations. **No delay claim will be considered based upon the Trade Contractor's failure to accommodate the laboratory turnaround time as identified above.**

All manifests or bills of lading utilized to accompany the transportation of the Contaminated Railroad Ties shall be prepared by the Trade Contractor and signed by an authorized Department representative, as Generator, for each truck load of material that leaves the site. The Trade Contractor shall forward the appropriate original copies of all manifests or bills of lading to the Engineer the same day the material leaves the Project.

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

D. **Material Transportation:** In addition to all pertinent federal, state and local laws or regulatory agency polices, the Trade Contractor shall adhere to the following precautions during the transport of Contaminated Railroad Ties off-site:

1. Prior to leaving the site, excess soil shall be removed from the Contaminated Railroad Ties. The ties shall then be reduced to sections of four (4) feet or less in length (if required by the disposal facility), loaded into containers, covered sufficiently to preclude the loss of material during transport, and remain covered until arrival at the selected disposal facility. Any soil removed from the Contaminated Railroad Ties shall be managed as directed by the Engineer.

2. 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.

3. No materials shall leave the site unless a treatment/recycling/disposal facility willing to accept all of the material being transported has agreed to accept the type and quantity of waste.

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

The Trade Contractor shall furnish labor, materials, tools and equipment for decontamination of all equipment and supplies that are used to handle Contaminated Railroad Ties. Decontamination shall be conducted at an area designated by the Engineer and shall be required prior to equipment and supplies leaving the Project, and between stages of the work.

The Trade Contractor shall use dry decontamination procedures. Residuals from dry decontamination activities shall be collected and managed as Controlled Materials. If the results from dry methods are unsatisfactory to the Engineer, the Trade Contractor shall modify decontamination procedures as required.

END OF SECTION 02 67 00

SECTION 03 05 05 - UNDERSLAB VAPOR BARRIER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Sheet vapor barrier under concrete slabs on grade.

1.2 RELATED REQUIREMENTS

A. Section 03 20 00 – Concrete Reinforcing.

B. Section 03 30 00 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.3 REFERENCE STANDARDS

A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.

B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 - Document Control.

B. Product Data: Submit manufacturers' data on manufactured products.

C. Test Data: Submit report of tests showing compliance with specified requirements.

D. Samples: Submit samples of underslab vapor barrier to be used.

E. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Underslab Vapor Barrier:
   1. Water Vapor Permeance: Not more than 0.3 perms, maximum, in accordance with ASTM E-96.
   2. Complying with ASTM E-1745 Class A.

3. Thickness: 6 mils minimum.

B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.2 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches.

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.

F. Repair damaged vapor retarder before covering with other materials.

END OF SECTION 03 05 05

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.2 RELATED REQUIREMENTS

A. Section 03 20 00 - Concrete Reinforcing.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 04 27 31 – Reinforced Unit Masonry: Reinforcement for engineered masonry.

D. Section 05 12 00 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.3 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute; 2010.

C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute; 2011.

D. ACI 347 - Guide to Formwork for Concrete; American Concrete Institute; 2004.

E. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers; 2010.

F. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2013.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 - Document Control.

B. Product Data: Provide data on void form materials and installation requirements.

C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in Connecticut.

B. Maintain one copy of each installation standard on site throughout the duration of concrete work.

1.6 MOCK-UP

A. Construct a mock-up of formwork for structural slab and retaining walls, 12 feet long by 12 feet wide.
   1. Include reinforcement, ties, and accessories specified in Section 03 20 00.
   2. Provide concrete in accordance with provisions of Section 03 30 00.
   3. Cure concrete in accordance with provisions of Section 03 30 00.

B. Locate mock-up where directed.

C. Mock-up may remain as part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver prefabricated forms and installation instructions in manufacturer's packaging.

B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.

C. Protect plastic foam products from damage and exposure to sunlight.

PART 2 - PRODUCTS

2.1 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.

C. Chamfer outside corners of beams, joists, columns, and walls.

D. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

E. Comply with relevant portions of ACI 347, ACI 301, and ACI 318.

2.2 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Trade Contractor.

2.3 FORMWORK ACCESSORIES

A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.

C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

D. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 12 00.

E. Preformed mineral celluloid strips, 3/8 inch thick, moisture expanding.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Coordinate this section with other sections of work that require attachment of components to formwork.

D. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Designer before proceeding.

3.3 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.4 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.5 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.6 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.

B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.

3.7 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 00.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.8 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION 03 10 00

SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Splicing of reinforcing for cast-in-place concrete

C. Supports and accessories for steel reinforcement.

1.2 RELATED REQUIREMENTS

A. Section 03 10 00 - Concrete Forming and Accessories.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 04 27 31 - Reinforced Unit Masonry: Reinforcement for engineered masonry.

1.3 REFERENCE STANDARDS

A.	ACI 301	Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.
B.	ACI 318	Building Code Requirements For Structural Concrete and Commentary; American Concrete Institute International; 2011.
C.	ACI SP-66	ACI Detailing Manual; American Concrete Institute International; 2004.
D.	ASTM A82/A82M	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
E.	ASTM A184/A184M	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2006 (Reapproved 2011).
F.	ASTM A185/A185M	Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.
G.	ASTM A615/A615M	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2012.
H.	ASTM A704/A704M	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement; 2006 (Reapproved 2011).

I. CRSI (DA4) Manual of Standard Practice; Concrete Reinforcing Steel Institute; 2009.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 - Document Control.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include material designations bar schedules, bending diagrams bars, spacing of bars, locations of splices, material designations, placement diagrams, and manufacturer's literature for mechanical connections

1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in Connecticut.

2. Any incidental provisions to the revision of materials furnish in accordance with shop drawings and order lists to make them comply with the requirements of the plans and specifications shall be borne by the Trade Contractor.

C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301.

B. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

A. Bar Reinforcement

1. Uncoated bar reinforcement shall conform to the requirements of ASTM A 615/A 615M, Grade 60(420).

2. 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.

3. Galvanized bar reinforcement shall conform to the requirements of ASTM A 615/A 615M, Grade 60 (420) and be galvanized, after fabrication, to the requirements of ASTM 767/A 767M, Class 1, including supplemental requirements.

4. Dowels and tie bars for masonry facing and for granite curbing shall be galvanized, after fabrication, in accordance with ASTM A 767/A 767M, Class 1.

5. Weldable bar reinforcement shall conform to the requirements of ASTM A 706/A 706M.

   Prior to incorporation into the work, samples of the uncoated, epoxy coated, galvanized and weldable bar reinforcement shall be submitted to the Engineer for destructive testing in accordance with the latest edition of the "Schedule of Minimum Requirements for Sampling Materials for Test". One sample, at least 60 inches long, shall be submitted for each size, source of supply, and type of bar reinforcement.

B. Unit Weight Mass: Listed below are the bar sizes with approximate diameters, areas, and weights

Table M.06.02 - A 615

Bar Designation No.	Nominal Weight (lb/ft)	Nominal Diameter* (in)	Nominal Cross Sectional Area* (sq.in.)	Nominal Perimeter* (in)
3	0.376	0.375	0.11	1.178
4	0.668	0.500	0.20	1.571
5	1.043	0.625	0.31	1.963
6	1.502	0.750	0.44	2.356
7	2.044	0.875	0.60	2.749
8	2.670	1.000	0.79	3.142
9	3.400	1.128	1.00	3.544
10	4.303	1.270	1.27	3.900
11	5.313	1.410	1.56	4.430
14	7.65	1.693	2.25	5.32
18	13.60	2.257	4.00	7.09

* The nominal dimensions of a deformed bar are equivalent to those of a plain round bar having the same weight pound per foot as the deformed bar.

** Bar numbers are based on the number of eighths of an inch included in the nominal diameter of the bars (bar numbers approximate the number of millimeters of the nominal diameter of the bar)

C. Wire and Welded Steel Wire Fabric: Wire shall be cold-drawn steel wire conforming to the requirements of ASTM A 82 (AASHTO M 32).

Welded steel wire fabric, when used as reinforcement in concrete, shall conform to the requirements of ASTM A 185 (AASHTO M 55). The type of welded steel wire fabric shall be approved by the Engineer.

D. Reinforcing Steel Mat: ASTM A704/A704M, using ASTM A615/A615M, Grade 60 (420) steel bars or rods, unfinished.

E. Dowel Bar Mechanical Connections: Dowel bar mechanical connections shall develop in tension and compression at least 125 percent of the specified yield strength of the bar reinforcement being spliced. Epoxy coated mechanical connectors shall be epoxy coated in accordance with the requirements of ASTM D 3963/D 3963M.

Galvanized mechanical connectors shall be galvanized, after fabrication, in accordance with the requirements of ASTM A 767/A 767M, Class 1, including supplemental requirements. Prior to incorporation into the work, samples of the uncoated, epoxy coated and galvanized dowel bar mechanical connections shall be submitted to the Engineer for destructive testing. One sample, complete with all the components, shall be submitted for each size, type and manufacturer of the dowel bar mechanical connections.

F. Deformed Steel Wire and Welded Deformed Steel Wire Fabric: Deformed steel wire shall be cold-worked, deformed steel wire conforming to the requirements of AASHTO M 225 (ASTM A 496). Welded deformed steel wire fabric, when used as reinforcement in concrete, shall conform to the requirements of AASHTO M 221 (ASTM A 497). The type of welded deformed steel wire fabric shall be approved by the Engineer.

G. Stirrup Steel: ASTM A82/A82M steel wire, unfinished, unless otherwise specified by the contract documents or by Engineer. Concrete within building shall use ASTM A615 stirrups.

H. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage, unless otherwise specified by the contract documents or by Engineer

2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.2 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice and this specification.

B. Cutting and Bending: Bar reinforcement shall be cut and bent to the shapes shown on the plans. Fabrication tolerances shall be in accordance with the requirements of ACI 315. All bars shall be bent cold, unless otherwise permitted.

Coated bars shall not be field cut, unless permitted by the Engineer. Field cutting of coated bars should be performed using hydraulic-powered cutters or friction cutting tools to minimize

coating damage and field touch-up. Flame cutting of coated bars will not be permitted. Field cut coated bars shall be repaired immediately.

Bars partially embedded in concrete shall not be field bent, except as shown on the plans or permitted by the Engineer.

C. Hooks and Bend Dimensions: The dimensions of hooks and the diameters of bends measured on the inside of the bar shall be as shown on the plans. When the dimensions of hooks or the diameter of bends are not shown, they shall be in accordance with the ACI 318, "Building Code Requirements for Reinforced Concrete" as amended by ASTM A767M for galvanized bars.

D. Identification: Bar reinforcement shall be shipped in standard bundles, tagged and marked in accordance with the CRSI "Manual of Standard Practice".

2.3 HANDLING, STORING, AND SURFACE CONDITION OF REINFORCEMENT

A. Steel reinforcement shall be stored above the surface of the ground on platforms, skids, or other supports and shall be protected as far as practical from mechanical injury and surface deterioration caused by exposure to conditions producing rust.

B. Epoxy-coated and galvanized reinforcing steel shall be handled and stored by methods that will not damage the coating. All systems for handling coated reinforcement shall have adequately padded contact areas wherever possible. All bundling bands shall be padded and all bundles shall be lifted with a strong back, multiple supports, or platform bridge so as to prevent bar-to-bar abrasion from sags in the bar bundle.

C. Bars or bundles shall not be dropped or dragged. Coated reinforcing steel shall be transported and stored on wooden or padded supports. Epoxy-coated reinforcing steel, stored at the job site, shall be protected by covering with opaque polyethylene or other suitable protective material. Provisions shall be made for adequate ventilation to prevent condensation under the covering. Since the epoxy coating is flammable, the epoxy coated reinforcing shall not be exposed to any fire or flame.

D. Prior to placement of concrete, all reinforcement shall be free from dirt, loose rust or scale, mortar, paint, grease, oil, or other materials that would reduce bond. Reinforcement shall be free from injurious defects such as cracks and laminations. Bonded rust, surface seams, surface irregularities, or mill scale will not be cause for rejection, provided the minimum dimensions, cross section area, and tensile properties of a hand wire brushed specimen meet the physical requirements for the size and grade of steel specified.

E. Lapped Splices: Lapped splices shall be of the lengths shown on the plans. In contact lap splices, the bars shall be placed in contact and tied together in such a manner as to maintain the minimum distance to the surface of the concrete shown on the plans.

In non-contact lap splices, the bars shall be placed as shown on the plans and tied to adjacent bars in such a manner as to maintain the minimum distance to the surface of the concrete shown on the plans.

F. Welded Splices: Welded splices shall be used at the locations shown on the plans. Welding shall conform to AWS publication "Structural Welding Code, Reinforcing Steel, AWS D1.4" and applicable specifications.

Welded splices shall not be used on epoxy-coated or galvanized bars. No welding shall be performed close enough to epoxy-coated or galvanized bars to cause any heating of the coating.

G. Splices made with Dowel Bar Mechanical Connections: Splices made with dowel bar mechanical connections shall be used at the locations shown on the plans. The minimum size of the bars and the length of the lap splices for the dowel bar mechanical connections shall be as shown on the plans. The mechanical connections shall be installed in accordance with the manufacturer's recommendations. All tools and equipment required to install and field inspect the connections shall be provided by the Trade Contractor. The Trade Contractor shall take all measures necessary to prevent concrete from adhering to the threaded portions of the mechanical connections.

After installing the coated mechanical connectors, all damaged areas on the coated connectors shall be repaired in accordance with Sub-article 3.1.E.

H. Splicing of Welded Wire Fabric: Welded wire fabric reinforcement shall be lap spliced as shown on the plans.

PART 3 - EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Steel reinforcement shall be accurately placed as shown on the plans and firmly held in position during the placing and setting of concrete.

1. Bars shall be tied at all intersections except where the spacing is less than 12 inches in each direction when alternate intersections shall be tied

2. Locate reinforcing splices not indicated on drawings at point of minimum stress.

3. Bars shall be tied at all intersections around the perimeter of each mat.

4. Bundled bars shall be tied together at not more than 6-foot centers. Lap splices shall have a minimum of 2 ties or be tied 12 inches apart for the length of the splice, whichever requires the greater number of ties. For epoxy-coated reinforcement, tie wires and metal clips shall be epoxy, plastic or nylon coated. For galvanized reinforcement, tie wires and metal clips shall be plastic coated or galvanized.

5. With the exception of tie down bars, welding (tack welding) will not be permitted for assembly of reinforcement, unless shown on the plans. Tie down bars shall be placed as shown on the plans and a top longitudinal reinforcing bar tied to these bars. When welding coated bars an appropriate protective mask must be worn, safety equipment used and suitable ventilation provided. If wire fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before being placed.

D. Support Systems: Reinforcing steel shall be supported in its proper position by use of precast mortar blocks, wire bar supports, supplementary bars (tie-down bars), side form spacers or other approved devices. Such devices shall be sufficiently strong and properly placed at frequent intervals so as to maintain the cover between the reinforcing and the surface of the concrete. The reinforcing steel cover shall be no less than that shown on the plans and no greater than that shown plus 1/4 inch. Platforms for the support of workers and equipment during concrete placement shall be supported directly on the forms and not on the reinforcing steel.

1. Precast Mortar Blocks: Precast mortar blocks shall have a compressive strength not less than that of the concrete in which they are to be embedded. The face of the blocks in contact with forms for exposed surfaces shall not exceed 2 inches x 2 inches in size and shall have a color and texture that will match the concrete surface. Precast mortar blocks shall not be used on exposed surfaces of precast concrete members. When used on vertical or sloping surfaces, such blocks shall have an embedded wire for securing the block to the reinforcing. When used in slabs, either such a tie wire or, when the weight of the reinforcing is sufficient to firmly hold the blocks in place, a groove in the top of the block may be used. For epoxy-coated bars, such tie wires shall be epoxy, plastic or nylon coated. For galvanized bars, such tie wires shall be plastic coated or galvanized.

2. Wire Supports: Wire bar supports, such as ferrous metal chairs and bolsters, shall conform to industry practice as described in the CRSI "Manual of Standard Practice of the Concrete Reinforcing Steel Institute." All bolsters or chairs which bear against the forms for exposed surfaces shall be equipped with snug fitting, high density, polyethylene tips which provide 1/2-inch minimum clearance between the metal and any exposed surface. For epoxy-coated reinforcement, all wire bar supports and bar clips shall be epoxy or plastic coated. For galvanized reinforcement, chair and bar supports shall be hot-dip galvanized, after fabrication, in accordance with ASTM A123.

3. The maximum spacing of slab bolster rows and high chair rows for concrete deck slabs shall be 4 feet unless otherwise directed by the Engineer.

E. Repair of Coated Reinforcing Steel:

1. Epoxy-coated Reinforcing Steel - In addition to the requirements of ASTM D3963M, all damage (i.e., scratches, nicks, cracks) to the epoxy coating of the bar reinforcement, visible to the unaided eye with corrective vision, caused during shipment, storage or placement shall be repaired by the Trade Contractor at the job site with approved patching material. Ends of bars that have been sheared, saw cut or cut by other means shall be coated with approved patching material. The areas on the bars and tie down bars damaged by welding shall be repaired with approved patching material.

   Patching of damaged areas shall be performed in accordance with the patching material manufacturer's recommendations. Any singular damaged surface area (prior to repair with

approved patching material), shall not exceed 2% of the total surface area of the bar. The total bar surface area covered by patching material shall not exceed 5% of the total surface area of the bar. Should either of these limits be exceeded the bar shall be removed from the work and replaced with an acceptable bar. All patching material shall be fully cured prior to placing concrete.

The patching material shall be compatible with the epoxy coating, inert in concrete, and suitable for repairs in the field. The patching material shall be prequalified, as required for the coating material, and shall be either identified on the container as meeting the requirements of Annex A1 of ASTM D3963M or shall be accompanied by a Materials Certificate certifying that the material meets the requirements of said Annex A1.

2. Galvanized Reinforcing Steel - All damage (i.e. scratches, nicks, cracks) to the galvanized coating on bar reinforcement, visible to the unaided eye with corrective vision, caused during shipment, storage or placement shall be repaired by the Trade Contractor at the job site in accordance with ASTM A780, Annex A2 - "Repair using Zinc-Rich Paints". Ends of bars that have been sheared, saw cut or cut by other means shall be coated with zinc-rich paint. The area on the bars and tie down bars damaged by welding shall be repaired with zinc-rich paint.

   Field coating of damaged areas shall be performed in accordance with the zinc-rich paint manufacturer's recommendations. The zinc-rich paint shall conform to FS TT-P-641, Type 1 and shall be brush applied to achieve a dry film thickness from 3 - 6 mils. All touchup paint shall be fully cured prior to placing concrete.

F. Maintain concrete cover around reinforcing as follows:
   1. Beams: 1 1/2 inch
   2. Supported Slabs, Walls, and Joists: 1 inch.
   3. Column Ties: 1 1/2 inch.
   4. Concrete exposed to weather or backfill: 2 inch.
   5. Concrete Formed Against Earth: 3 inch.

G. Conform to applicable code for concrete cover over reinforcement.

H. Substitutions: Substitution of different size bars will be permitted only when authorized by the Engineer. The substituted bars shall have an area equivalent to or larger than the area shown on the plans.

3.2 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 45 00, will inspect installed reinforcement for conformance to contract documents before concrete placement. Concrete placed prior to approval of the reinforcement may be rejected by the Engineer and the Trade Contractor shall be responsible for the removal and replacement.

END OF SECTION 03 20 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete building frame members.

B. Elevated concrete slabs.

C. Floors and slabs on grade.

D. Joint devices associated with concrete work.

E. Concrete shear walls, elevator shaft walls, and foundation walls.

F. Miscellaneous concrete elements, including equipment pads.

G. Miscellaneous site elements, including sidewalks, thrust blocks, drainage structures, waterstops, driveway aprons, bollards, and other site elements as directed by Engineer.

H. Concrete curing, sealing, and protection.

I. Retaining walls.

1.2 RELATED REQUIREMENTS

A. Section 03 05 05- Underslab Vapor Barrier

B. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.

C. Section 03 20 00 - Concrete Reinforcing.

D. Section 03 30 10 – Concrete Floor Hardener.

1.3 REFERENCE STANDARDS

A.	ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
B.	ACI 301	Specifications for Structural Concrete; American Concrete Institute International; 2010.
C.	ACI 302.1R	Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (Errata 2007).

D.	ACI 304R	Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
E.	ACI 305R	Hot Weather Concreting; American Concrete Institute International; 2010.
F.	ACI 306R	Cold Weather Concreting; American Concrete Institute International; 2010.
G.	ACI 308R	Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).
H.	ACI 318	Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.
I.	ASTM C33/C33M	Standard Specification for Concrete Aggregates; 2013.
J.	ASTM C39/C39M	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2012a.
K.	ASTM C94/C94M	Standard Specification for Ready-Mixed Concrete; 2013.
L.	ASTM C143/C143M	Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
M.	ASTM C150/C150M	Standard Specification for Portland Cement; 2012.
N.	ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
O.	ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
P.	ASTM C494/C494M	Standard Specification for Chemical Admixtures for Concrete; 2013.
Q.	ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2012.
R.	ASTM C881/C881M	Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2010.
S.	ASTM C1240	Standard Specification for Silica Fume Used in Cementitious Mixtures; 2012.
T.	ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2008).
U.	ASTM E1745	Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

V. COE CRD-C 572 Corps of Engineers Specifications for Polyvinylchloride Waterstop; Corps of Engineers; 1974.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 - Document Control.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit proposed concrete mix design.

1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.

2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

D. 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. The Owner printed on ticket

2. Name of producer, identification of plant

3. Date and time of day

4. Type of material

5. Cubic yards of material loaded into truck

6. Project number, purchase order number, name of Trade Contractor (if Trade Contractor other than producer)

7. Truck number for specific identification of truck

8. Individual aggregate, cement, water weights and any admixtures shall be printed on plant tickets

9. Water/cement ratio

10. Additional water allowance in gallons based on water/cement ratio for mix

E. Curing Plan: The Trade Contractor shall submit to the Engineer, if requested, at least fourteen (14) days prior to the placement of concrete, a detailed curing plan that describes the following:

1. The initial and final curing durations.

2. Equipment and materials to be used for curing concrete and monitoring concrete temperature, where required.

3. Proposed primary and secondary water and heat sources, if applicable.

D. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

F Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

G. Samples: Submit samples of underslab vapor retarder to be used.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318 and as defined here-in.

B. Follow recommendations of ACI 305R when concreting during hot weather and as defined here-in.

C. Follow recommendations of ACI 306R when concreting during cold weather and as defined here-in.

D. Acceptance Testing and Test Specimens: The Trade 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 Trade Contract.

1. 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.

STANDARD MIX CLASS	AIR CONTENT	SLUMP	CONCRETE TEMPERATURE
A (3300 psi)	6.0 ±1.5%	4" ± 1"	60°F-90°F
C (3300 psi)			
F (4400 psi)			
Modified Standards	6.0 ±1.5% **	4" ± 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.

** If the only modification is the addition of HRWR, the maximum allowable slump shall be 7 inches.

*** 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.

2. 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.

    a. The Trade Contractor shall provide and maintain facilities on the Project site, acceptable to the Engineer, for sampling, transporting the initial sample, casting, safe storage and initial curing of the concrete test specimens as required by AASHTO T-23. This shall include but not be limited to a sampling receptacle, a means of transport of the initial concrete sample from the location of the concrete placement to the testing location, a level and protected area of adequate size to perform testing, and a specimen storage container capable of maintaining the temperature and moisture requirements for initial curing of Acceptance specimens. The distance from the location of concrete placement to the location of testing and initial curing shall be 100 feet or less, unless otherwise approved by the Engineer.

    b. The specimen storage container described in this section is in addition to the concrete cylinder curing box provided for elsewhere in the Contract documents.

    c. 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.

3. Sampling Procedure for Pumping: It is the responsibility of the Trade Contractor to provide concrete that meets specification at the point of placement.

    a. 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 Trade Contractor may submit an alternate location to provide a sample from the discharge end of the pump with verification showing that the characteristics of the mix will not be altered from that of which would have been attained at the point of placement. The Engineer will review the documentation and other extenuating circumstances when evaluating the request.

4. 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.

E. 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.

1. The personnel, equipment, and molds for sampling, casting, curing and testing of Progression Cylinders shall be furnished by the Trade Contractor at no expense to the Department.

2. 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.

3. 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.

4. A minimum of two (2) of cylinder results will be used to determine in-place strength.

5. Compression testing shall be performed in accordance with AASHTO T-22 by personnel approved by the Engineer.

6. Certified Test Report in accordance with Section 01 33 00 Submittal Procedures 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.

F. A State inspector may be present to monitor batching and/or weighing operations.

G. The Trade 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.

H. 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.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Comply with requirements of Section 03 10 00.

2.2 REINFORCEMENT

A. Comply with requirements of Section 03 20 00.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal Portland type.

B. Fine and Coarse Aggregates: ASTM C 33.

C. Fly Ash: ASTM C618, Class C.

D. Calcined Pozzolan: ASTM C618, Class N.

E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.

F. Water: Clean and not detrimental to concrete.

2.4 CONCRETE MATERIALS FOR SITE ELEMENTS

A. 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 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.

1. 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.

2. 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%.

3. Gradation: Grading and stone sizes of the coarse aggregate shall conform to this specification 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.

4. 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.

5. Reclaimed Concrete Aggregate: In addition to the above requirements (1-4), when reclaimed concrete aggregate is proposed, it shall be tested for chloride content. If blended with virgin aggregate, reclaimed aggregate shall be tested prior to being mixed. The test used to determine chloride content shall be that outlined 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. Regardless of chloride content, reclaimed concrete aggregate shall not be used in concrete mixes used for pre-stressed concrete construction.

B. 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.

1. Fine Material: Fine aggregate shall contain not more than 3% of material finer than a #200 sieve, as determined by AASHTO T 11.

2. 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.

3. 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.

Table M.03.01-1

Square Mesh Sieves	Percent Passing by Weight (mass)
Pass $^{3}/_{8}$ inch	100
Pass #4	95-100
Pass #8	80-100
Pass #16	50-85
Pass #30	25-60
Pass #50	10-30
Pass #100	2-10

4. 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.

5. 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.

C. Cement:

1. 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 Nonstandard Mix Designs. All cement shall be provided by a mill participating in the Departments' Cement Certification program. The requirements of the Certification Program are detailed in the Departments' Quality Assurance Program for Materials.

2. Pre-Blended Cements: Binary or Ternary cements consisting of Portland Cement and supplemental cementitious materials may be used provided that all the requirements of this specification are met.

3. Replacement Materials: Unless already approved as a Standard Mix Design, any Trade 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.

a. 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 15% of the required Portland cement. The fly ash shall be substituted on a weight (mass) basis, with a minimum of 1 pound of fly ash for 1 pound 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.

b. 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 15% 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 of slag for 1 pound of Portland cement. Different sources of GGBFS shall not be permitted on any single project without the written approval of the Engineer.

D. 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. 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.

2.5 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260.

C. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

D. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

E. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

F. Accelerating Admixture: ASTM C494/C494M Type C.

G. Retarding Admixture: ASTM C494/C494M Type B.

H. Water Reducing Admixture: ASTM C494/C494M Type A.

2.6 ADMIXTURES FOR SITE ELEMENTS

A. All admixtures shall perform their function without injurious effects upon the concrete. If requested by the TDC, the Trade 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 Trade Contractor. The results of at least 5 standard 6-inch x 12-inch cylinders of each mix design shall be listed with the results of at least 5 like-sized cylinders not utilizing the admixture(s). Specimens must be made and cured in the laboratory in accordance with AASHTO T 126 and will be tested in accordance with AASHTO T 22.

B. 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 whereas tests for bleeding, bond strength and volume change will not be required.

C. Other Chemical Admixtures: In the event that concrete properties are specified that require the use of additional admixtures, or the Trade 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.

2.7 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System: Complying with ASTM C881/C881M and of Type required for specific application.

B. Waterstops: Rubber, complying with COE CRD-C 513. Use dumbbell type across joints where water intrusion could occur.

C. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

   1. Material: ASTM D1752 Type I or II.

D. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum 1 inch diameter holes for conduit or rebars to pass through at 6 inches on center; ribbed steel stakes for setting.

E. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.

2.8 BONDING AND JOINTING PRODUCTS FOR SITE ELEMENTS

A. Refer to Section 32 16 13.13 Cast-in-Place Concrete Curbs and Gutters for expansions filler and joint fillers.

B. Joint Sealants:

1. 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 project specifications.

2. Joint Sealer for Structures: Structure joint sealers shall be one of the following type sealants:

a. 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-S00230C Type II-Class A or an approved equal. A Certified Test Report will be required in accordance with Section 01 33 00 Submittal Procedures, 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 Trade Contractor, a Materials Certificate shall be required to identify the shipment.

b. Where "Silicone Joint Sealant" is specified on the plans, it shall be one of the following or an approved equal:

i. Sealant, manufactured by the Dow Corning Corporation, Midland, Michigan Dow Corning 888 Silicone Joint Sealant

ii. Dow Corning 888-SL Self-Leveling Silicone Joint 48686-0994

C. Closed Cell Elastomer: The closed cell elastomer shall conform to the requirements of ASTM D1056, Grade RE41B2. The elastomer shall have a pressure-sensitive adhesive backing on one side.

1. The Trade 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 Trade 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 Trade Contractor shall immediately notify the Engineer.

2. 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 Trade Contractor shall furnish a Certified Test Report in accordance with Section 01 33 00 Submittal Procedures, 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 Trade Contractor, a Materials Certificate shall be required to identify shipment

3. The Trade Contractor shall furnish a 1 foot length of closed cell elastomer in each lot for purposes of inspection and testing by the Engineer. The Engineer will cut a 1 foot sample from each lot and inspect the sample for conformance to size, and perform physical tests on the sample as deemed necessary.

4. 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 Trade Contractor has removed or corrected, in a manner acceptable to the Engineer, all non-conforming material.

D. Protective Compound / Sealers: The brand and type oif materials must be listed on the Department's Qualified Products List and approved by the Engineer for the specified use.

2.9 CURING MATERIALS

A. Curing and Sealing Compound: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309.

B. Moisture-Retaining Sheet: ASTM C171.

2.10 CURING MATERIALS FOR SITE ELEMENTS

A. Water: Any water source deemed acceptable by the Engineer for mixing concrete may be used to provide water for curing purposes. Surface water may be used if classified as Class C or Class D on the Department of Energy and Environmental Protection (DEEP) Water Quality Classification mapping and accommodations have been made to prevent contaminants from entering the supply to the satisfaction of the Engineer. In general, water shall not be taken from shallow or muddy sources. In cases where sources of supply are relatively shallow, the intake pipe shall be enclosed to exclude silt, mud, grass, etc.; and the water in the enclosure shall be maintained at a depth of not less than 2 feet under the intake pipe.

B. 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 Trade Contractor as determined by the Engineer.

C. 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.

D. White Polyethylene Sheeting (Film): White polyethylene sheeting (film) shall conform to the requirements of AASHTO M 171.

2.11 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

C. Normal Weight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
3. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
4. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
5. Cement Content: Minimum 50 lb per cubic yard.
6. Water-Cement Ratio: Maximum 40 percent by weight.
7. Maximum Slump: 4 inches.
8. Maximum Aggregate Size: 5/8 inch.
9. Air-Entrainment: Exterior concrete exposed to weather shall be air-entrained.

2.12 CONCRETE MIX DESIGN FOR SITE ELEMENTS

A. The composition of the concrete shall be in accordance with the requirements set forth in this specification for Concrete Materials for Site Elements, as well as the applicable sections of ACI 211 and ACI 318. The Trade Contractor shall submit all concrete mix designs to the Division of Materials Testing for review and approval prior to production of the design. At the option of the Trade Contractor, other approved cementitious material may be used to replace a portion of the required Portland cement in accordance with the requirements in this specification for Concrete Materials for Site Elements.

1. Since the yield is theoretical, the Department will not be responsible for any variation in yield as actually obtained on the job. Consistency of the concrete shall be uniformly maintained within the allowable range of slump. The slump shall be measured in accordance with AASHTO Method T119.

2. The concrete shall be air-entrained and shall contain an air content of 6% ± 1 1/2% at the time the concrete is deposited on the grade. Air entrainment shall be obtained by use of an approved air-entraining admixture added to the concrete at the time of mixing.

3. The air content of the plastic concrete shall be determined in accordance with AASHTO Method T152, Pressure Method. No alternative method will be accepted.

4. No change in the source or character of the materials shall be made without due notice to the Engineer, and no new material shall be used until the Engineer has

accepted such materials and has designated new proportions based upon tests of new trial mixes as provided hereinbefore.

B. Standard ConnDOT Mix Designs: Standard Mix Designs shall be designed in accordance with applicable sections of ACI 211 and ACI 318. The mixtures shall consist of Portland cement, fine aggregate, coarse aggregate, admixtures*, and water proportioned in accordance with Table M.03.02-1. The mixtures shall also be designed to obtain the physical properties of plastic concrete as specified here-in.

Table M.03.02-1 – Cement Classification

TYPE	28-Day Minimum Compressive Strength (psi)	Water/Cement or Water/Cement plus other approved Cementitious Material, By Weight, Maximum	Minimum Cement Required** (lbs/cy)	Maximum Aggregate Size Required (Refer to Table M.01.01)
Class A	3300	0.53	615	No. 4
Class C	3300	0.53	658	No. 6
ClassF	4400	0.44	658	No. 6

* Approved admixtures may be used in proportions recommended by the manufacturer.

** Portland Cement may be partially replaced within a Standard Mix Design by other approved cementitious material meeting the requirements of Sub-article 2.4 of this specification if permitted by the Engineer.

*** Reclaimed miscellaneous aggregate shall only be used where authorized in the specifications

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 this specification.

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.

Table M.01.01 – Aggregate Gradation

Passing Square Mesh Sieves	No. 4	No.6	No.8
2 inch	100		
1 ½ inch	90-100		
1 inch	20-55	100	
¾ inch	0-15	90-100	
½ inch		20-55	100
$^{3}/_{8}$ inch	0-5	0-15	85-100
No. 4		0-5	10-30
No. 8			0-10
No. 16			0-5

C. Non-Standard Department Mix Designs for Site Elements: 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 nonstandard.

All Non-standard Mix Designs used for load-bearing structures shall contain a minimum of 658 lbs/cubic yard 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 of cementitious materials.

Flowable Fill shall have a maximum aggregate size required of No. 8 stone.

2.13 MATERIAL STORAGE

A. Each cementitious material shall be stored in a separate, weatherproof compartment clearly identified.

B. Sites for aggregate stockpiles shall be reasonably smooth, hard, well-drained areas. Aggregates from different sources and of different gradation shall not be stockpiled together.

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.

2.14 BATCHING PLANT AND EQUIPMENT

A. Equipment necessary for handling materials and performing all parts of the work shall be approved by the Engineer as to design, capacity, and mechanical condition. The equipment shall be at the job site sufficiently ahead of the start of construction operations to be examined thoroughly and approved. After approval, the Trade Contractor shall maintain all equipment and tools in a satisfactory working condition until the completion of the work.

B. General: The batching plant shall include storage bins, weighing hoppers, scales, and metering equipment as required. A separate scale for cementitious materials shall be used.

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 by the governing authority.

1. 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.

2. In addition to the requirements of approved third party certification, the facility shall produce batch tickets that conform to this specification.

3. Quality Control: The Trade 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 Trade 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.

4. 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.

C. 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 in volume.

D. Scales: Scales for measuring concrete ingredients may be horizontal beam-type, spring-less scales or electronic devices and shall conform to the applicable requirements of the NIST Handbook 44 except as otherwise specified herein.

Weight-indicating devices shall be in full view and near enough to be read accurately by the operator while charging the hoppers. The operator shall have convenient access to all controls.

When beam-type scales are used, a "tell-tale" dial shall be provided for indicating to the operator that the required load in the weighing (measuring) hopper is being approached. A device on measuring beams shall indicate critical positions clearly. The dial faces of spring-less dial scales shall be of a material not affected by moisture. The graduated dial scale shall be provided with the required number of suitable markers in front of the dial face which may be set at the required positions of the indicator for predetermined weights

Methods for weighing (measuring) (electric, hydraulic, load cells, etc.) other than the methods noted above, which meet the required weighing (measuring) tolerances may be approved by the Engineer.

E. Ten certified standard 50-pound weights shall be available at the batching plant for checking the accuracy of the scales. Weights shall be certified by the Department of Consumer Protection.

F. The Trade Contractor shall notify the Engineer 2 days in advance that the scales are in proper adjustment and ready to be sealed. The bins shall be filled sufficiently to perform the tests required, and the Trade Contractor shall have available a man skilled in making any adjustments necessary to seal the scales. The Engineer may request that the scales, after checking with a 500-pound weight, be resealed at any time, if in his opinion the scales are out of adjustment. Scales shall be "sealed" at the expense of the Trade Contractor by the "Sealer of Weights and Measures." Scales shall be inspected and sealed at least once every 12 months.

G. Automation: All plants shall be equipped with an approved automatic cycling and monitoring system installed as part of the batching equipment, unless otherwise indicated in the plans or specifications or in the opinion of the Engineer, job conditions warrant otherwise. The system shall include equipment for accurately proportioning the various components of the mixture by weight.

Admixtures and water may be measured volumetrically. The automatic proportioning system shall be capable of consistently delivering each constituent within the tolerances specified.

There shall be auxiliary interlock cutoff circuits to interrupt and stop the automatic batching operations whenever an error exceeding the acceptable tolerance occurs in proportioning for all material components except water. Zero return tolerance shall be equal to that of the delivery tolerances for the minimum batch size.

When the aggregate sizes are weighed cumulatively, the tolerance for each bin draw weight shall be based on the total aggregate batch weight. If aggregate sizes are weighed (measured) separately, the percentage shall apply to each scale weight. When the other approved cementitious material is weighed (measured) cumulatively with the cement, the other approved cementitious material shall be last in the weighing (measuring) sequence, and the batching delivery tolerance for each material draw weight shall be based upon the total weight of cement plus other approved cementitious material.

The electrical circuits used to check delivery tolerances may be set at any span within the full allowable tolerance for any approved batch size. For plants not equipped to automatically adjust tolerances, the tolerance span shall be set for the minimum approved batch size whenever varying batch sizes are being produced.

Batching Delivery Tolerances:

Cementitious materials ± 1% (by weight)

Aggregate ± 2% (by weight)

Water ± 1% (by weight or volume—applies at central mix plants only)

Admixtures ± 3% (by weight or volume—or ± 1 ounce, whichever is greater)

The automatic proportioning system shall be capable of rapidly selecting and proportioning at least 3 classes of concrete. In addition, the system shall have the capability of batching materials in at least 2 batch sizes. These provisions will not be required for project-site plants batching only 1 class of concrete for a project. The system shall be interlocked during the batching of cement and aggregates so that:

1. No inlet gate can be opened while the weigh (measuring) hopper discharge gate is open.

2. No weight (measuring) hopper discharge gates can be opened

3. While the hopper is being filled.

4. Until the full batch weight is within the delivery tolerance.

5. No new batch can be measured until the hopper is entirely empty of the previous batch and the scale has returned to "zero."

6. When the manual batching is permitted, the constituents shall be batched within the indicated delivery tolerances for the automatic proportioning system.

E. Slump Control: Controls shall be provided so that the batch plant operator can produce concrete of the slump required by the paving operation. Included shall be a moisture compensation system, a slump meter, and a slump-adjust control. The moisture compensation control can be automatically or manually set for the amount of moisture in the fine aggregate. A moisture compensation system shall compute the adjustment to the water and the fine aggregate components of the concrete to be measured by the automatic batching plant. The actual amounts of each material batched shall be recorded in the manner required elsewhere in these specifications.

F. Batch Recording Instruments: All concrete batching plants shall be equipped with digital or graphical recording instruments approved by the Engineer. The recording instruments shall be designed to record the quantities of each aggregate component, cement, other approved cementitious materials (when used), water (at central mix batch plants), and the presence of admixture for each batch of concrete produced. All records of batches shall show the batch number, the day, the month, the year, and the time of day to the nearest minute for each batch. This information shall be imprinted on the record so that each batch may be permanently identified. The Department shall be provided with a clear and legible copy of all batch records for concrete supplied to the Department.

Cement, other approved cementitious material, and aggregate component weights shall be recorded separately. Water at central mix plants may be recorded by weight or volume. When a digital tape or ticket recorder is used, weights shall be recorded as indicated on the batching scale or meter within an accuracy of ± 1 scale or meter graduation. The minimum resolution of digital recorders shall be equivalent to the minimum graduation on the scale meter, unless otherwise approved by the Engineer

If graphical recorders or multiple recorders, either digital or graphical, are used, they shall be subject to the approval of the Engineer.

The control system shall include a mixer timer which is interlocked with the mixer discharge control, such that the concrete will be mixed for the approved time.

If any of the above equipment fails to operate satisfactorily, the Engineer shall be notified immediately, and the Engineer will assign an inspector to the plant to monitor plant operation. Only if job conditions warrant, the Engineer may allow concrete to be delivered to the project without an inspector at the plant to monitor plant operation. When the plant is permitted to operate by manual control during periods of automatic equipment failure, a manually written ticket providing all the specified batch information required from the automatic "batch recording instrument" will be required for each batch supplied to the Department.

The plant shall be returned to compliance with these specifications within 2 working days of the equipment failure. After that period, concrete will not be accepted by the Department. The Trade Contractor is responsible for any production loss, or delays due to the enforcement of this requirement.

2.15 MIXING

A. General: Concrete may be mixed at the site of construction or at a central point. Truck-mixed or transit-mixed concrete may be used with the permission of the Engineer for limited amounts of pavement and for other exceptional cases. Each mixer shall have attached in a prominent place a manufacturer's plate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades.

B. Mixers at site of construction or at a central point: Mixing shall be in an approved mixer capable of combining the aggregates, cement, and water into a thoroughly mixed and uniform mass within the specified mixing period, and of discharging the mixture without segregation.

C. Mixing time: The mixing time requirements shall be in accordance with the recommendations of the manufacturer of the mixer. If a mixing time of less than 60 seconds is recommended, the Trade Contractor shall furnish test data acceptable to the Engineer, verifying that the reduced mixing time will produce uniform concrete conforming to the provisions of AASHTO M157.

   The mixer shall be operated at a drum speed as shown on the manufacturer's name plate on the approved mixer. Any concrete mixed less than the specified time shall be discarded and disposed of by the Trade Contractor at his expense. The volume of concrete mixed per batch shall not exceed the mixer's nominal capacity in cubic feet, as shown on the manufacturer's standard rating plate on the mixer, except that an overload up to 10% above the mixer's nominal capacity may be permitted provided concrete test data for strength and uniform consistency are satisfactory, and provided no spillage of concrete takes place.

D. Transit Mixers: Comply with ASTM C94/C94M.

E. Hauling central mix concrete: Mixed concrete from the central mixing plant shall be transported in truck mixers, truck agitators, or non-agitating trucks. The time elapsing from the time water is added to the mix until the concrete is deposited in place at the site of the work shall not exceed 30 minutes when the concrete is hauled in non-agitating trucks, nor 60 minutes when hauled in truck mixers or truck agitators, except that in hot weather or under other conditions contributing to quick stiffening of concrete, the maximum allowable time may be reduced by the Engineer.

F. Addition of water in truck mixers: When mixed concrete is transported in approved truck mixers, water may be added to the concrete at the delivery site, with the permission of the Engineer, to achieve the required slump, provided the specified water-cement ratio for the concrete is not exceeded and the concrete is mixed for at least thirty additional revolutions at mixing speed to ensure thorough mixing of the water into the concrete. Further addition of water to the concrete after the initial slump adjustment will not be permitted.

2.16 ACCESSORY MATERIALS

A. Underslab Vapor Barrier: See section 03 05 05.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

A. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

B. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.

C. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

D. All forms, slip form pavers, and other equipment used in the placing, curing, and finishing of concrete shall be of a design acceptable to the Engineer and meet the requirements of Section 03 10 00 Concrete Forming and Accessories.

1. Forms: Forms shall be set by the Trade Contractor to true line and grade.
2. The specified grade shall be set and compacted prior to the setting of forms.
3. Conditioning of Subgrade or Base Course:
   a. The subgrade or base course shall be brought to proper cross-section.
   b. High areas shall be trimmed to proper elevation. Low areas shall be filled and compacted to a condition similar to that of surrounding grade. The finished grades shall be maintained in a smooth and compacted condition until the concrete is placed.

E. All reinforcement shall be set by the Trade Contractor as required by Section 03 20 00 Concrete Reinforcing or otherwise specified in the contract documents. It shall be the Trade Contractor’s responsibility to remove and replace any section of concrete poured prior to inspection of reinforcement as required by Section 03 20 00 Concrete Reinforcing.

3.3 TRANSPORTING MATERIALS

A. Transportation of Mixture: Trucks delivering concrete shall be qualified in accordance with Sub-article 2.15 Mixing

If the concrete mix arrives at the Project with a slump lower than allowed by specification, water may be considered as a means to temper concrete to bring the slump back to within specification. This tempering may only be done prior to discharge with the permission of the

Engineer. The quantity of water in gallons added to the concrete cannot exceed the allowance shown on the delivery ticket.

The concrete shall be completely discharged into the forms within 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 90ºF. This time may also be reduced if the temperature of the concrete is over 90ºF. Trade Contractor shall be responsible for disposal of rejected concrete.

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 Trade Contractor is responsible for follow-up quality control testing to verify compliance with the Specifications.

3.4 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R, and as defined here-in.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

G. 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.

Placement of concrete for each section of the structure shall be performed continuously between construction or expansion joints as shown on the plans. The delivery rate, placing sequence and methods shall be such that fresh concrete is always placed and consolidated against previously placed concrete before initial set has occurred. The temperature of the concrete mixture during placement shall be maintained between 60ºF and 90ºF. The

temperature of the concrete shall be determined in accordance with ASTM C1064. 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.

1. 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 this specification.

   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.

2. Placement Methods: The Trade 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, the Trade Contractor shall take action to prevent segregation of the mix and spattering of mortar on steel and forms above the elevation of the lift being placed. This restriction shall not apply to cast-in-place pilings.

   When using stay-in-place forms, concrete shall not be dropped more than 3 feet above the top of the forms, and the concrete shall be discharged directly over the beams or girders.

3. Pumping: The Trade Contractor shall use equipment specifically manufactured to pump concrete mixes and that meets the needs of the specific concrete placement.

4. Consolidation: Unless otherwise specified, all concrete shall be sufficiently consolidated by mechanical vibration immediately after placement.

The Trade 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 Trade Contractor shall have an adequate number of operable vibrators available in case of breakdown.

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. Concrete shall be thoroughly consolidated against and along the faces of all forms and along the full length and on both sides of all joint assemblies, by means of vibrators inserted in the concrete. Vibrators shall not be permitted to come in contact with a joint assembly, the grade, or a side form. In no case shall the vibrator be operated longer than 5 seconds in any one location.

Concrete shall be deposited as close to expansion and contraction joints, if present, as possible without disturbing them, but shall not be dumped from the discharge bucket or hopper on to a joint assembly unless the hopper is well centered on the joint assembly.

Should any concrete materials fall on or be worked into the surface of a completed slab, they shall be removed immediately by Engineer approved methods.

H. Mass concrete placement: mass concrete placement shall be defined as any placement in which the concrete being cast has dimensions of 5 feet or greater in each of three (3) different directions. For placements with a circular cross-section, a concrete placement shall be defined as any placement that has a diameter of 6 feet or greater and a height of 5 feet or greater. For all concrete placements, the mix temperature shall not exceed 85°F as measured at point of discharge into the forms.

Any special concrete mix design proposed by the Trade Contractor to meet the above temperature requirements shall be submitted to the Engineer for review.

3.4 SLAB JOINTING

A. Locate joints as indicated on the drawings.

B. Joints: Joints shall be constructed of the type and dimensions, and at the locations required by the plans or specifications. All joints shall be protected from the intrusion of injurious foreign material until sealed

C. Anchor joint fillers and devices to prevent movement during concrete placement.

D. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

   1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.

E. Load Transfer Construction and Contraction Joints: Install load transfer devices as indicated; saw cut joint at surface as indicated for contraction joints.

F. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

G. Longitudinal Joint: Deformed steel tie bars of specified length, size, spacing and material shall be placed perpendicular to the longitudinal joints; they shall be placed by approved mechanical equipment or rigidly secured by chairs or other approved supports to prevent displacement. Tie bars shall be coated with epoxy conforming to AASHTO M284. When shown on the plans and when adjacent lanes of pavement are constructed, steel side forms shall be used which will form a keyway along the construction joint. Tie bars may be bent at right angles against the form of the first area constructed and straightened into final position before the concrete of the adjacent area is placed, or in lieu of bent tie bars, approved two-piece connectors may be used.

Longitudinal formed joints shall consist of a groove or cleft, extending downward from, and normal to, the surface of the finished concrete. These joints shall be effected or formed by an approved mechanically or manually operated device to the dimensions and line indicated on the plans and while the concrete is in a plastic state. The groove, or cleft, shall be filled with either a pre-molded strip or poured material.

The longitudinal joint, however formed, shall be continuous. There shall be no gaps in either transverse or longitudinal joints at the intersection of the joints.

Longitudinal sawed joints shall be cut by means of approved concrete saws to the depth, width and line shown on the plans. Suitable guidelines or devices shall be used to assure cutting the longitudinal joint on the true line as shown on the plans. The longitudinal joint shall be sawed within 36 hours of placement and before any other equipment or vehicles are allowed on the pavement. The sawed area shall be thoroughly cleaned and the joint shall immediately be filled with sealer.

H. Transverse Expansion Joints: The expansion joint fillers shall be continuous from edge to edge, shaped to the subbase and to the keyway along the edge. Preformed joint filler shall be furnished in lengths equal to the pavement width or equal to the width of one lane. Damaged or repaired joint filler shall not be used unless approved by the Engineer. The expansion joint filler shall be held in a vertical position. An approved installing bar, or other device shall be used if required to secure preformed expansion joint filler at the proper grade and alignment during placing and finishing of the concrete. Finished joints shall not deviate more than 1/4 inch in the horizontal alignment from a straight line. If joint fillers are assembled in sections, there shall be no offsets between adjacent units. No plugs of concrete shall be permitted anywhere within the expansion space.

I. Transverse Contraction Joints: Transverse contraction joints shall consist of planes and of weakness created by forming or cutting grooves in the surface of the pavement and, when shown on the plans, shall include transfer assemblies.

a. Formed grooves shall be made by depressing an approved tool or device into the plastic concrete. The tool or device shall remain in place until the concrete has attained its initial set and shall then be removed without disturbing the adjacent concrete, unless the device is designed to remain in the joint.

b. Sawed contraction joints shall be created by sawing grooves in the surface of the pavements of the dimensions and at the spacing and lines shown on the plans with an approved concrete saw. After each joint is sawed, the saw cut and adjacent concrete

surface shall be thoroughly cleaned. Sawing of the joints shall commence as soon as the concrete has hardened sufficiently to permit sawing without excessive raveling, usually 4 to 24 hours. All joints shall be sawed before uncontrolled shrinkage cracking takes place. If necessary, the sawing operations shall be carried on both during the day and night, regardless of weather conditions. The sawing of any joint shall be omitted if a crack occurs at or near the joint location prior to the time of sawing. Sawing shall be discontinued when a crack develops ahead of the saw. In general, all joints should be sawed in sequence. If extreme conditions exist, which make it impractical to prevent erratic cracking by early sawing, the contraction joint groove shall be formed prior to initial set of concrete as provided above. The Engineer will review and approve procedures and methods to correct random cracking.

c. Transverse formed contraction joints shall comply with the requirements for the longitudinal formed joint.

d. Transverse Construction Joints: Transverse construction joints shall be constructed when there is an interruption of more than 30 minutes in the concreting operations. No transverse joint shall be constructed within 10 feet of an expansion joint, contraction joint, or plane of weakness. If sufficient concrete has not been mixed at the time of interruption to form a slab at least 10 feet long, the excess concrete back to the last preceding joint shall be removed and disposed of as directed.

J. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.5 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. The completed surface shall be constructed in accordance with grades and cross slopes shown on the plans or defined in the contract documents. The entire surface shall be checked by the Trade Contractor in the presence of the Engineer, with an acceptable 10 foot straightedge.

1. Exposed Concrete Floors: 1/4 inch in 10 ft.
2. Under Seamless Resilient Flooring: 1/4 inch in 10 ft.
3. Under Carpeting: 1/4 inch in 10 ft.

B. Variances greater than these, which, in the opinion of the Engineer, may adversely affect the quality of the surface or will effect installation of other items shall be corrected. It is the responsibility of the Trade Contractor to perform the repairs. The Trade 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.

3.6 CONCRETE FINISHING

A. Sequence: The sequence of operations shall be the strike-off and consolidation floating and removal of laitance, and final surface finish. Work bridges or other devices necessary to provide access to the pavement surface for the purpose of finishing, straight-edging, and making corrections as hereinafter specified, shall be provided by the Trade Contractor.

In general, the addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted. If the application of water to the surfaces is permitted, it shall be applied as a fog spray by means of Engineer approved spray equipment.

B. Repair surface defects, including tie holes, immediately after removing formwork.

C. After the concrete has been struck off and consolidated it shall be further smoothed, trued, and consolidated by means of a float prior to final finishing of the surface.

D. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

E. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height.

F. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:

1. Interior Slabs: "Steel trowel" as described in ACI 302.1R.
2. Exterior Slabs: "Broomed" as described in ACI 301.1R.

G. For Radio Vehicle Maintenance Bay floor drains, maintain floor elevation at walls; pitch surfaces uniformly as indicated on the Drawings.

H. 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 Trade 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 Section 04 05 11 Masonry Mortaring and Grouting. 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:

1. 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.
2. 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 Trade Contractor will be directed to provide a grout clean down finish.

3. 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. It shall be the Trade Contractor's responsibility to dispose of Grout which has set, it shall not be re-tempered.

   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.

4. 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 Sub-article 3.6.G, "Finishing Concrete Surfaces."

5. After completion of the placing and finishing operation and for at least twelve (12) hours after the concrete has set, the Trade 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.

6. The addition of water to the surface of the concrete to assist in finishing operations will not be permitted.

J. Finishing at Joints: The concrete adjacent to joints shall be compacted or firmly placed without voids or segregation against the joint material, under and around all load transfer devices, joint

assembly units, and other features designed to extend into the concrete. Concrete adjacent to joints shall be mechanically vibrated.

K. Edging at Forms and Joints: After the final finish, but before the concrete has taken its initial set, the edges of the pavement along each side of each slab, and on each side of transverse expansion joints, formed joints, transverse construction joints, and emergency construction joints shall be worked with an approved tool and rounded to the radius required by the plans.

A well-defined and continuous radius shall be produced and a smooth, dense mortar finish obtained. The surface of the slab shall not be unduly disturbed by tilting the tool during use. At all joints, any tool marks appearing on the slab adjacent to the joints shall be eliminated by brooming the surface. In doing this, the rounding of the corner of the slab shall not be disturbed. All concrete on top of the joint filler shall be completely removed. All joints shall be tested with a straight edge before the concrete has set, and correction made if one side of the joint is higher than the other or if they are higher or lower than the adjacent slabs.

3.7 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than 7 days.

C. Surfaces Not in Contact with Forms:

1. 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 Trade Contractor furnish a curing plan as defined in this specification.

   The duration of the initial and final curing period in total shall continue uninterrupted for a minimum of seven (7) days.

2. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.

3. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water-saturated materials. Such materials may consist of cotton mats, multiple layers of burlap, or other approved materials that do not discolor or otherwise damage the concrete.

   a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.

   b. Spraying: Spray water over floor slab areas and maintain wet.

   c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.

4. Final Curing: Begin after initial curing but before surface is dry.

a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.

b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

D. When concrete is being placed and the air temperature may be expected to drop below 35°F a sufficient supply of straw, hay, grass, or other suitable blanketing material shall be provided along the work and any time the temperature may be expected to reach the freezing point during the day or night, the material so provided shall be spread over the pavement to a sufficient depth to prevent freezing of the concrete. During the period of time such protection, the Trade Contractor shall be responsible for the quality and strength of the concrete placed during cold weather, and any concrete injured by frost action shall be removed and replaced at the Trade Contractor's expense.

E. Sealing Joints: Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including the Trade Contractor's equipment. Just prior to sealing, each joint shall be thoroughly cleaned of all foreign material, including membrane curing compound and the joint-faces shall be clean and surface dry when the seal is applied.

The sealing material shall be applied to each joint opening to conform to the details shown on the plans or as directed by the Engineer. Material for seal applied hot shall be stirred during heating so that localized overheating does not occur. The pouring shall be done in such a manner that the material will not be spilled on the exposed surfaces of the concrete. The use of sand or similar material as a cover for the seal will not be permitted. Poured joint-sealing material shall not be placed when the air temperature in the shade is less than 50°F, unless approved by the Engineer.

Preformed elastomeric gaskets for sealing joints shall be of the cross sectional dimensions shown on the plans. Seals shall be installed by suitable tools, without elongation, and secured in place with an approved lubricant adhesive which shall cover both sides of the concrete joints. The seals shall be installed in a compressed condition and shall at time of placement be below the level of the pavement surface by approximately 1/4 inch (6.4 millimeters). The seals shall be in one piece for the full width of each transverse joint.

F. Where required, Liquid Membrane-Forming Cure: The liquid curing compound shall conform to this specification. When resin-based curing compound is used, it shall be applied following the final finishing immediately after the disappearance of the water sheen and before any surface checking or marked dehydration of the concrete occurs.

When water-soluble, linseed oil-based compound is used, it shall be applied immediately following the final finishing.

The compound shall be applied by an approved self-propelled mechanical pressured sprayer delivering a fine, even spray with uniform coverage. This equipment shall be provided with a suitable device for adequate agitation of the compound to prevent settlement. For the sides of concrete pavement exposed after removal of the forms and for areas where the use of self-propelled equipment is not practical, approved hand-held spray bars delivering a fine, even spray may be used; and the compound shall be drawn from a tank equipped with an approved device to prevent settlement or by a method which will prevent settlement.

If the compound is applied in two applications, the second application shall follow the first application within 30 minutes. The compound shall be applied in a continuous, uniform film at not less than one gallon for 150 square feet.

If rain falls on the newly coated concrete before the film has dried sufficiently to resist damage, or if the film is damaged in any other way, the Trade Contractor will be required to apply a new coat of material to the affected areas equal in curing value to that specified for the original coat. The treated surface shall be protected by the Trade Contractor from injury for a period of at least 7 days. All traffic, either foot or otherwise, will be considered as injurious to the film of the applied compound.

The Trade Contractor shall have on the project sufficient approved cover sheet or cotton mats for the protection of the pavement in case of rain or breakdown of the spray equipment. The cotton mats shall be maintained in a wet condition during the period of use, as elsewhere herein specified.

Transverse joints shall be protected from the compound by means or methods approved by the Engineer.

G. If the Trade Contractor wants to increase the early strength of the pavement in order to facilitate his plan for the paving sequence, he may substitute TYPE III Portland Cement, or use a concrete with a higher cement factor. The mix design for this concrete must be approved by the Engineer. The Trade Contractor is responsible for the additional work and material required for this change unless otherwise specified by the Engineer.

3.8 APPLICATION OF LOADS

A. 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.

1. 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.

2. Construction Loads: Light materials and equipment may be hand carried concrete surfaces 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 Trade 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.

3. Precast concrete 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.

B. Any damage to the concrete occurring prior to the opening of the surface for use shall be repaired or replaced by the Trade Contractor.

3.9 PROTECTION FROM ENVIRONMENTAL CONDITIONS

A. 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.

B. Rain Protection: The placement of concrete shall not commence or continue unless adequate protection satisfactory to the Engineer is provided by the Trade Contractor.

C. Hot Weather Protection: When the ambient air temperature is above 90°F, the forms, which will come in contact with the mix shall be cooled to below 90°F for a minimum of 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.

D. Cold Weather Protection: When there is a probability of ambient air temperature below 40°F during placement and curing, a Cold-Weather Concreting Plan shall be submitted to the Engineer for review and comment. The Plan shall detail the methods and equipment, including temperature measuring devices that will be used to ensure that the required concrete and air temperatures are maintained.

1. Placement: The forms, reinforcing steel, steel beam flanges, and other surfaces which will come in contact with the mix shall be heated to a minimum of 40°F, by methods satisfactory to the Engineer, for a minimum of 1 hour prior to, and maintained throughout, concrete placement.

2. Curing: For the first six (6) days, considered the initial cure period, the concrete shall be maintained at a temperature of not less than 45°F and the air temperature surrounding the structure shall be maintained at a temperature of not less than 60°F. When the concrete mix includes pozzolans or slag, the initial cure period shall be increased to ten (10) days. After the initial cure period, the air surrounding the structure shall be maintained above 40° F 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 or caused to change temperature by more than 20°F 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.

3.10 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 00.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 75 cu yd or less of each class of concrete placed.

E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.11 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to CTDOT PM and Trade Contractor within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Trade Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

3.12 DISPUTE RESOLUTION

A. The basis of any dispute resolution is side-by-side and quality control testing by the Trade Contractor or the Trade Contractor's representative. The Trade 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 Trade 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.

B. Air Content: Trade 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 Trade Contractor's test results vary from those of the Engineer, the Trade 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 Trade 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.

C. Compressive Strength: Trade 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 Trade Contractor wish to pursue a dispute resolution with regard to compressive strength, the Trade 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 Trade Contract specifications. The Engineer will consider the submittal and may average specific test results on the disputed lot(s) for acceptance and adjustment purposes.

D. Destructive testing of any kind on the placed concrete structure will not be allowed.

END OF SECTION 03 30 00

SECTION 03 30 10 CONCRETE FLOOR HARDENER

PART 1 - GENERAL

The General Provisions of the Trade Contract, including General and Special Conditions and the requirements of Division 1, apply to the Work in this Section.

1.1 RELATED DOCUMENTS

A. Provisions of Section 03 30 00 Cast-In-Place Concrete, apply to this Section.

1.2 SUMMARY

A. This Section specifies a pre-mixed, ready to use mineral aggregate surface hardener that is proportioned, mixed and packaged at the manufacturer's owned and operated factory.

B. This product is composed of processed mineral aggregates, cement binders, plasticizers, water reducing admixtures and other proprietary ingredients.

1.3 REFERENCES

A.	ACI 211.1-91	Standard Practice for Selecting Proportions for Normal, Heavyweight and mass Concrete
B.	ACI 301-89	Specification for Structural Concrete Buildings
C.	ACI 302.1R-96	Guide for Concrete Floor and Slab Construction
D.	ACI 304.1E-89	Guide for Measuring, Mixing, Transporting and Placing Concrete.
E.	ACI 305 R-91	Hot Weather Concreting
F.	ACI 306 R-89	Cold Weather Concreting
G.	ACI 308	Standard practice for Curing Concrete
H.	ASTM A 185	Specification for Steel Welded Wire, Fabric, Plain for Concrete Reinforcement
I.	ASTM A 497	Standard Specification for Deformed Steel Welded Wire Fabric.
J.	ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens
K.	ASTM C94	Specification for Ready-Mix Concrete.
L.	ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete
M.	ASTM C 494	Specification for Chemical Admixtures for Concrete

N. ASTM C 779 Standard Test Method for Abrasion Resistance of Horizontal Concrete

1.4 QUALITY ASSURANCE

A. Job Mock-Up: In a location designated by the CTDOT Project Manager, place a minimum 100 square foot floor mock-up using actual job site materials and installation procedures proposed for use in the project. Revise materials and procedures as directed by the CTDOT Project Manager to obtain acceptable finish surface. Do not destroy the approved mock-up panel until the floor has been accepted.

1. Maintain the same controls and procedures used in the accepted mock-up throughout the project.

B. Field Support: During job mock-up and initial period of installation, the manufacturer of the surface hardener will provide, at no cost, a trained, full-time employee to aid in instructing the proper use of the product.

1. Notify surface hardener manufacturer at least one week prior to initial use of the product.

C. Installer’s Qualifications: Engage an experience installer who has a minimum of 5 years experience in the application of floor finishes similar to that required for this project.

D. Manufacturer’s Qualifications: minimum 10 years experience in manufacturing concrete surface hardeners; manufacturer shall be ISO 9001.2000 Certified.

1.5 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 - Document Control.

B. Product Data: Submit manufacturer's technical bulletins and MSDS on each product.

C. Quality Control Submittals:

1. Provide protection plan of surrounding areas and non-cementitious surfaces.

1.6 WARRANTY

A. Warrant work specified herein for eighteen months from substantial completion against defects in materials, function and workmanship.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to loose, damaged, and missing parts and abnormal deterioration of finish.

D. Submit warranties in accordance with Division 01 - General Requirements of these specifications.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver material appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per this specification.

C. Provide materials specified complete in one shipment. Split or partial shipments are not permissible.

D. Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

E. Store in unopened packaging in clean, dry environment protected from sunlight at 50 degrees F

1.8 PROJECT CONDITIONS

A. Ensure that substrate surface and ambient air temperature are minimum of 50 degrees F (10 degrees C) during curing period. Ensure that frost or frozen surfaces are thawed and dry.

B. Allow surfaces to attain temperature and conditions specified before proceeding with surface hardener application.

C. Do not install over concrete containing calcium chloride or concrete containing aggregate that has been saturated with salt water.

D. Do not install over concrete containing more than 3 percent air content as measured by ASTM C138, ASTM C173, or ASTM C231.

E. Maximum slump of concrete shall be 5 inches (127 mm) for slabs.

F. Do not use admixtures that substantially increase or decrease the rate of bleeding.

G. Consult the dry shake material supplier for approved mix designs and additives.

H. Perform Work of this Section in well-ventilated areas.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Concrete: Provide concrete materials complying with requirements of Section 03 30 00.

B. Surface Hardener: cementitious dry-shake floor hardener with graded metallic aggregate which improves wear and impact resistance of concrete floors; surface hardener applied at a rate of 1.0 to 2.0 lb/ft2 (4.9 to 9.8 kg/m2). Color to be Light Reflective.

C. Monomoleculular Film: evaporation reducer can be used under severe drying conditions, due to high concrete and/or ambient temperatures, low humidity, high winds, etc. including working in heated interiors during cold weather, to aid in the maintaining of concrete moisture, during the early placement stages of plastic concrete (Misuse of this material may compromise color of dry shake).

D. Curing Compound

E. Joint Filler: Epoxy joint filler installed as per manufacturer's recommendation.

F. Contingent upon compliance with these specifications and documentation requirements set forth in Section 01 33 00 SUBMITTAL PROCEDURES, provide materials produced by manufacturers regularly producing concrete hardening materials, including but not limited to the following:

1. The Euclid Chemical Company
   19218 Redwood Road
   Cleveland, OH 44110

   Website: www.euchlidchemical.com

2. BASF Construction Chemicals, LLC- Building Systems
   889 Valley Park Drive
   Shakopee, MN 55379

   Website: www.BASFbuildingsystems.com

3. ARDEX Americas
   400 Ardex Park Drive
   Aliquippa, Pennsylvania 15001

   Email: info@ardexamericas.com

4. Dayton Superior Corporation
   7777 Washington Village Dr., Ste. 130
   Dayton, OH 45459

   Website: www.daytonsuperior.com

PART 3 - EXECUTION

3.1 CONCRETE PLACEMENT

A. Section 03 30 00, Cast-In-Place Concrete, specifies basic concrete materials and placement requirements.

B. For wear resistant concrete floors, provide concrete with the following additional requirements:

1. Maximum slump of 5 inches (127 mm) for slabs on grade.

2. Do not install over concrete containing more than 3% air content per ASTM C 138, ASTM C 173, or ASTM C 231.

3. Do not use calcium chloride or set-accelerating admixtures containing calcium chloride.

4. Do not use admixtures that substantially increase/decrease the rate of bleeding.

5. Consult the dry shake material supplier for approved mix designs and additives.

3.2 APPLICATION OF SURFACE HARDENER

A. Pump, place or otherwise convey the base concrete at a slump that is not in excess of 5 inches for a slab on grade. After the concrete has been placed, immediately "screed", then "bullfloat/highway straightedge" the surface. Allow bleed water to rise to surface.

B. Early moisture loss and rapid setting around the perimeter of the slab are typical, and should be monitored closely for proper timing of the floating operation. Do not apply dry-shake into bleed water. If excessive bleed water is present, remove standing water by dragging a hose across the surface, use a squeegee or other approved method, and/or wait until the surface has lost its sheen.

C. After the water sheen has disappeared, just prior to initial set (a finisher with knee boards will leave approximately 1/8 to 1/4 inch impression), float the surface of the slab "open" with a mechanical float fitted with float shoes.

D. Completely read and follow dry shake manufacturer's installation instructions. Place and integrate dry shake with a minimum two pass process. Two-thirds to one-half of the total amount is applied and floated on the first application, and the remaining amount (s) on the succeeding applications. Do not apply the dry shake into the bleed water.

1. Apply the first application of the dry shake so that a uniform distribution of the surface hardener is obtained. The most efficient, economical and precise method of applying a dry shake is through the use of an automatic spreader. When the application of the surface hardener will be conducted by hand or square-tip shovel, apply each pass perpendicular to the previous application to better ensure complete coverage.

2. Once the shake has absorbed sufficient moisture (the surface will somewhat darker), float (incorporate dry shake into) the surface with a floating machine equipped with flat shoes, or with a wooden bullfloat. A heavy wood float is preferable as it tends to open the slab rather than closing it off and possibly trapping bleed water under the dry shake layer. Hand float edges with wood floats and/or darbys.

3. As the floating of the first application of the dry shake proceeds, follow immediately behind this floating operation with the subsequent shake application.

4. Once the shake has absorbed sufficient moisture (the surface will somewhat darken), float the surface with a floating machine equipped with float shoes, or a wooden float. Hand float edges with wood floats and/or darbys.

5. If applicable, as the floating of the dry shake proceeds, follow immediately with subsequent shake application.

6. When more than 1.0 lb/ft^2 (4.9 kg/m^2) will be applied or in hot and windy conditions, more than two shake applications may be necessary. Under no circumstance should water, evaporation retarders or finishing agents be applied to help “wet up” the dry shake. Early moisture loss and rapid setting around the perimeter of the slab are typical, and should be monitored closely for proper timing of the floating operation.

E. When appropriate, conduct 2 to 3 mechanical trowellings.

1. Leave the prepared slab untouched until the surface has lost its sheen and can support the weight of a finisher and finishing machine. At this point, conduct the first trowelling of the surface. On the first application, keep trowel blades as flat as possible without digging into the surface.

2. As the surface “tightens” further, the trowel blades may be gradually raised to produce the desired surface.

3. As the surface further stiffens, indicated by loss of sheen, hand or mechanically trowel with blades set relatively flat. Remove all marks and pinholes in the final raised trowel application.

4. All moisture used to incorporate dry shake material must come from within the slab. Under no circumstances should water be applied to aid in the incorporation of the dry shake. Under severe or rapid drying conditions, the use of an approved evaporation reducer may be mist-sprayed onto the dry shake according to current installation instructions to prevent rapid moisture loss.

3.2 CURING AND PROTECTION

A. At the completion of final trowelling and when the surface will not be marred, apply an approved membrane curing compound according to the directions.

B. After drying, protect hardened surface by covering with scuff-proof, non-staining building paper or polyethylene.

C. Keep floors covered and free of traffic and loads for a minimum of 10 days after completion.

D. Maintain ambient temperature of 50° F (10°C) or above during the curing period.

3.3 JOINT FILLING

A. After a minimum of 90 days, apply a semi-rigid epoxy joint filler, or other joint filler material approved by surface hardener manufacturer, in all control and saw cut construction joints. Place joint filler in a method complying with manufacturer’s instructions.

3.4 INSTALLATION

A. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.5 CLEANUP & PROTECTION

A. Wipe and clean floor of any oil, grease, and solvents, and make ready for use.

B. Clean area around installation and remove packing or installation debris from job site.

C. Notify CTDOT PM for acceptance inspection.

D. Protect finished floors from staining, scratches and dents, paint or drywall spray or spots and other forms of discoloration or damage.

END OF SECTION 03 30 10

SECTION 03 36 00 - CONCRETE FLOOR FINISHES

PART 1 GENERAL

1. 1 SECTION INCLUDES

A. Concrete Hardening and Sealing Agent.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 Cast-In-Place Concrete

1.3 REFERENCE STANDARDSS

A. American Society for Testing and Materials:

1. ASTM-C779, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
2. ASTM G23-81, Ultraviolet Light & Water Spray
3. ASTM C805, Impact Strength

B. American Concrete Institute

1. ACI 302. 1R-89, Guide for Concrete Floor and Slab Construction

C. Other Test:

1. Reflectivity

1.4 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures

B. See Section 01 33 00.13 Document Control.

C. Product data:

1. Manufacturer's specifications and test data.
2. Description of product to be provided, including manufacturer’s name and product name.
3. Recommended installation procedures.
4. Technical data sheet giving descriptive data, curing time, and application requirements.

5. Material Safety Data Sheet (MSDS) and other safety requirements.

D. Test Reports:

1. Certified test reports, prepared by an independent testing laboratory, confirming compliance with specified performance criteria.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Manufacturer shall certify applicator.

2. Applicator shall be familiar with the specified requirements and the methods needed for proper performance of work of this section.

B. Manufacturer's Certification:

1. Letter of certification from concrete finish manufacturer stating that installer is certified applicator of special concrete finishes, and is familiar with proper procedures and installation requirements required by the manufacturer.

C. Mock-ups:

1. Apply mock-ups of each type finish, to demonstrate typical joints, surface finish, color variation (if any), and standard of workmanship.

a. Build mock-ups approximately 50 square feet in the location as directed by the CTDOT Project Manager.

b. Notify CTDOT Project Manager seven days in advance of dates and times when mock-ups will be constructed.

c. Obtain CTDOT Project Manager approval of mock-ups before starting construction.

d. If the CTDOT Project Manager determines that mock-ups do not meet requirements, demolish and remove them from the site and cast others until mock-ups are approved.

e. Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed work.

f. Approved mock-ups may become part of the completed work if undisturbed at time of substantial completion.

D. Protection

1. No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential.

a. All hydraulic powered equipment must be diapered to avoid staining of the concrete.

b. No trade shall park vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.

c. No pipe cutting machine shall be used on the inside floor slab.

d. Steel shall not be placed on interior slab to avoid rust staining.

e. Acids and acidic detergents shall not come into contact with slab.

f. All trades informed that the slab shall be protected at all times.

E. Pre-Installation Conference:

1. Conduct conference at project site.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original containers, with seal's unbroken, bearing manufacturer labels indicating brand name and directions for storage.

B. Dispense material from factory numbered and sealed containers. Maintain record of container numbers.

1.7 FIELD CONDITIONS

A. Environmental limitations:

1. Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.

a. Concrete Floor Flatness rating recommended at least 40, where possible.

b. Concrete Floor Levelness rating recommended at least 30, where possible.

c. Concrete must be cured a minimum of 45 days or as directed by the manufacturer before application can begin.

d. Application shall take place 10 days prior to installation of equipment and substantial completion, thus providing a complete, uninhibited concrete slab for application.

B. Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.

1.8 WARRANTY

A. See Section 01 78 30 – Warranties and Bonds for additional warranty requirements.

B. Provide manufacturer ten (10) year warranty after date of substantial completion against failure or degradation of floor finish.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. HARDENING/SEALING AGENT

1. Retro-Plate 99, manufactured by Advanced Floor Products, Inc., P.O. Box 50533, Provo, Utah 84605, 801-812-3420 or equal.

a. Performance Criteria:

i. Abrasion Resistance: ASTM C779 – Up to 400% increase in abrasion resistance.

ii. Impact Strength: ASTM C805 – Up to 21% increase impact strength.

iii. Ultra Violet Light and Water Spray: ASTM G23-81 – No adverse effect to ultra violet and water spray.

iv. Reflectivity: Up to 30% increase in reflectivity.

2. Substitutions: See Section 01 60 00 – Product Requirements

2.2 RELATED MATERIALS

A. Neutralizing Agent:

1. Tri-sodium Phosphate

B. Water:

1. Potable

PART 3- EXECUTION

3.1 SURFACE CONDITIONS:

A. Examine substrate, with installer present, for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.

B. Verify that base slab meet finish and surface profile requirements in Division 3 Section "Cast-In-Place Concrete," and Project Conditions above.

C. Prior to application, verify that floor surfaces are free of construction latents.

3.2 APPLICATION

A. Start any of the floor finish applications in presence of manufacturer's technical representative.

B. Sealing, Hardening and Polishing of Concrete Surface

1. Concrete must be in place a minimum of 45 days or as directed by the manufacturer before application can begin.
2. Application is to take place at least 10 days prior to racking and other in-store accessory installation, thus providing a complete, uninhibited concrete slab for application
3. Only a certified applicator shall apply floor finish. Applicable procedures must be followed as recommended by the product manufacturer and as required to match approved test sample.
4. Achieve waterproofing, hardening, dust-proofing, and abrasion resistance of the surface without changing the natural appearance of the concrete, except for the sheen.
5. Polish to required sheen level.

3.3 WORKMANSHIP AND CLEANING:

A. The premises shall be kept clean and free of debris at all times.

B. Remove spatter from adjoining surfaces, as necessary.

C. Repair damages to surface caused by cleaning operations.

D. Remove debris from jobsite
1. Dispose of materials in separate, closed containers in accordance with local regulations.

3.4 PROTECTION:

A. Protect finished work until fully cured in accordance with manufacturer's recommendations.

END OF SECTION 033600

SECTION 04 05 11 - MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.2 RELATED REQUIREMENTS

A. Section 04 27 31 - Reinforced Unit Masonry: Installation of mortar and grout.

1.3 REFERENCE STANDARDS

A.	ACI 530/530.1/ERTA	Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.
B.	ASTM C5	Standard Specification for Quicklime for Structural Purposes; 2010.
C.	ASTM C91/C91M	Standard Specification for Masonry Cement; 2012.
D.	ASTM C94/C94M	Standard Specification for Ready-Mixed Concrete; 2013.
E.	ASTM C144	Standard Specification for Aggregate for Masonry Mortar; 2011.
F.	ASTM C150/C150M	Standard Specification for Portland Cement; 2012.
G.	ASTM C207	Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
H..	ASTM C230	Standard Specification for Flow Tables for Use in Tests of Hydraulic Cement
I.	ASTM C270	Standard Specification for Mortar for Unit Masonry; 2012.
J.	ASTM C387/C387M	Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2011b.
K.	ASTM C404	- Standard Specification for Aggregates for Masonry Grout; 2011.
L.	ASTM C476	- Standard Specification for Grout for Masonry; 2010.
M.	ASTM C780	Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.

N. ASTM C1019 Standard Test Method for Sampling and Testing Grout; 2013.

O. ASTM C1072 Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.

P. ASTM C1107 Standard Specification for Packaged Dry hydraulic Cement Grout (Nonshrink)

Q. ASTM C1142 Standard Specification for Extended Life Mortar for Unit Masonry; 1995 (Reapproved 2013).

R. ASTM C1314 Standard Test Method for Compressive Strength of Masonry Prisms; 2012.

S. ASTM E518 Standard Test Methods for Flexural Bond Strength of Masonry; 2010.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 - Document Control.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

C. Reports: Submit reports on mortar indicating conformance of mortar to property requirements of ASTM C 270 and test and evaluation reports per ASTM C 780.

D. Reports: Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C 1019.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.7 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 - PRODUCTS

2.1 MORTAR AND GROUT APPLICATIONS

A. At Trade Contractor's option, mortar and grout may be made from factory premixed dry materials with addition of water only or ready-mixed.

B. Mortar Mix Designs: ASTM C270, Property Specification.
   1. Engineered Masonry: Type S.
   2. Exterior, Loadbearing Masonry: Type S.
   3. Exterior, Non-loadbearing Masonry: Type S.
   4. Interior, Loadbearing Masonry: Type S.
   5. Interior, Non-loadbearing Masonry: Type S.

C. Grout Mix Designs:
   1. Bond Beams and Lintels: 3,000 psi strength at 28 days; 9 inches slump; provide premixed type in accordance with ASTM C 94/C 94M or mix in accordance with ASTM C476.
   2. Engineered Masonry: 3,000 psi strength at 28 days; 9 inches slump; provide premixed type in accordance with ASTM C 94/C 94M or mix in accordance with ASTM C476.
   3. Site Masonry (Drainage, Underground Duct work, and otherwise Engineer Specified): 3,000 psi strength at 28 days; mixed to the requirements of ASTM C230, premixed type in accordance with ASTM 1107.

2.2 MATERIALS

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: Type S.
   2. Color: Standard gray.

B. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type S mortar in accordance with ASTM C270 with the addition of water only.
   1. Color: Standard gray.

C. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
   1. Type: Fine.

D. Portland Cement: ASTM C150.
   1. Type: Type I - Normal.
   2. Color: Standard gray.

E. Masonry Cement: ASTM C91.
   1. Type: As scheduled on the drawings.

F. Hydrated Lime: ASTM C207, Type S.

G. Quicklime: ASTM C5, non-hydraulic type.

H. Mortar Aggregate: ASTM C144.

I. Grout Aggregate: ASTM C404.

J. Water: Clean and potable.

K. Bonding Agent: Latex type.

2.3 MORTAR MIXING

A. Ready Mixed Mortar: ASTM C1142, Type equivalent to that specified according to ASTM C270.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. If water is lost by evaporation, re-temper only within two hours of mixing.

2.4 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M, except grout for site masonry which shall be mixed to a flowable consistency as determined by ASTM C230.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

D. Do not use anti-freeze compounds to lower the freezing point of grout.

2.5 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 45 00.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.

C. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.

PART 3 - EXECUTION

3.1 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.2 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

3.3 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Trade Contractor's option, subject to other limitations of contract documents.

B. Low-Lift Grouting:
   1. Limit height of pours to 16 inches.
   2. Limit height of masonry to 16 inches above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

C. High-Lift Grouting:
   1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
   2. Hollow Masonry: Limit lifts to maximum 4 feet and pours to maximum height of 24 feet.
   3. Place grout for spanning elements in single, continuous pour.

3.4 FIELD QUALITY CONTROL

A. Test and evaluate mortar in accordance with ASTM C780 procedures.
   1. Test with same frequency as specified for masonry units.

B. Test and evaluate grout in accordance with ASTM C1019 procedures.
   1. Test with same frequency as specified for masonry units.

C. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION 04 05 11

SECTION 04 20 01 - MASONRY VENEER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-Faced Concrete Block.

B. Reinforcement and Anchorage.

C. Flashings.

D. Accessories.

E. Installation of Lintels.

1.2 RELATED REQUIREMENTS

A. Section 01 18 13 – Sustainable Design Requirements

B. Section 04 05 11 - Masonry Mortaring and Grouting.

C. Section 05 50 00 - Metal Fabrications: Loose steel lintels.

D. Section 07 90 05 - Joint Sealers: Backing rod and sealant at control and expansion joints.

1.3 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2013.

D. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2013.

E. ASTM A 167 – Standard Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

1.5 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 – Document Control.

B. Product Data: Provide data for masonry units, reinforcement and anchorage, flashings, and accessories.

C. Samples: Submit four samples of prefaced block units to illustrate color, texture, and extremes of color range.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Pre-Faced Units: 50 of each type, size, and color combination.

1.6 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.7 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar and accessories and structural backup in mock-up.

B. Locate where directed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Handle and store pre-faced concrete block units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

1.9 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depth of 4 inches.
   2. Pre-Faced Units: ASTM C90, solid block, with ground and sealed facing, integral color, and integral waterproofing.
      a. Colors and styles: As selected from manufacturer’s standard colors.

b. Manufacturer: York Building Products; Gemstone: www.yorkbuilding.com., or rqual.
c. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 05 11.

2.3 REINFORCEMENT AND ANCHORAGE

A. Joint Reinforcement: Truss type; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

B. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
1. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
2. Vertical adjustment: Not less than 3-1/2 inches.
3. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.
4. Manufacturers:
a. Hohmann & Barnard, Inc (including Dur-O-Wal brand); Product 170-2X Truss Eye-Wire: www.h-b.com , or equal.
b. Substitutions: See Section 01 60 00 - Product Requirements.

2.4 FLASHINGS

A. Copper/Polyethylene Flashing: Polyethylene film laminated to a 2 oz/sq ft copper sheet through a fiberglass scrim.
1. Manufacturer:
a. Hohmann & Barnard, Inc; Copper-Flex: www.h-b.com , or equal
b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Drip Plate: 2-inch wide preformed drip edge of type 304 stainless steel ASTM A167, with 3/8-inch bend.
1. Manufacturer:
a. Hohman & Barnard; DP-DRIP PLATE, or equal
b. Substitution: See Section 01 60 00- Product Requirements

2.5 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
1. Manufacturers:
a. Hohmann & Barnard, Inc (including Dur-O-Wal brand); Product RS Series: www.h-b.com , or equal
b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Weeps: Molded PVC grilles, insect resistant.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc; Product 342W: www.h-b.com , or equal.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Mortar Diverter: Panels installed at flashing locations.
      a. Manufacturers:
         1) Hohman & Barnard; Product Mortar Trap or equal.
         2) Substitutions: See Section 01 60 00 - Product Requirements.

D. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Coursing: One unit and one mortar joint to equal 8 inches.
   2. Mortar Joints: Concave.

3.3 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

C. Remove excess mortar as work progresses.

D. Interlock intersections and external corners, except for units laid in stack bond.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

G. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.

3.4 WEEPS

A. Install weeps in veneer walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

3.5 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch greater than panel thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Fit to perimeter construction and penetrations without voids.

D. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep.

3.6 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 32 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

F. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

G. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.7 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 4 inches to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend metal flashings to within 1/4 inch of exterior face of masonry.

C. Lap end joints of flashings at least 4 inches and seal watertight with mastic or elastic sealant.

D. Provide drip plate.

3.8 LINTELS

A. Install steel lintels over openings.

3.9 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control and expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.10 TOLERANCES

A. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

3.11 CUTTING AND FITTING

A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

3.13 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 20 01

SECTION 04 27 31 - REINFORCED UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete Block.

B. Reinforcement and Anchorage.

D. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 81 13 – Sustainable Design Requirements

B. Section 03 20 00 - Concrete Reinforcing: Reinforcing steel for grouted masonry.

C. Section 04 05 11 - Masonry Mortaring and Grouting.

D. Section 04 20 01 – Masonry Veneers: Concrete Masonry Veneer and Flashings

E. Section 05 50 00 – Metal Fabrications: Steel Lintels and Plates.

F. Section 07 84 00 - Firestopping: Firestopping at penetrations of masonry work.

G. Section 07 90 05 - Joint Sealers: Backing rod and sealant at control and expansion joints.

1.3 REFERENCE STANDARDS

A.	ACI 530/530.1/ERTA	Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.
B.	ASTM A82/A82M	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
C.	ASTM A153/A153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
D.	ASTM A615/A615M	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2013.
E.	ASTM A1064/A1064M	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2013.

F. ASTM C90 — Standard Specification for Loadbearing Concrete Masonry Units; 2013.

G. ASTM C129 — Standard Specification for Nonloadbearing Concrete Masonry Units

H. ASTM C140/C140M — Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2013.

I. ASTM C1072 — Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.

J. ASTM C1314 — Standard Test Method for Compressive Strength of Masonry Prisms; 2012.

K. ASTM E518 — Standard Test Methods for Flexural Bond Strength of Masonry; 2010.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 - Document Control.

B. See Section 01 81 13 – Sustainable Design

C. Product Data: Provide data for masonry units, fabricated wire reinforcement, and anchorage.

D. Shop Drawings: Indicate bar sizes, spacings, reinforcement quantities, bending and cutting schedules, reinforcement supporting and spacing devices, and accessories.

E. Design Data: Indicate required mortar strength, unit assembly strength in each plane, and supporting test data.

F. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.6 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar and accessories, structural backup, reinforcement, and grout in mock-up.

B. Mock-up may remain as part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.8 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depth of 8 inches.
   2. Special Shapes: Provide non-standard blocks configured for corners, lintels, and control joint edges. Provide bullnose corners for exposed interior corners.
   3. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block.
   4. Non-Load-Bearing Units: ASTM C129
      a. Hollow block

2.2 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 05 11.

2.3 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615/A615M Grade 60 (420).
   1. Deformed billet-steel bars.

B. Joint Reinforcement: Conform to ASTM A82. Use ladder type joint reinforcement, unless otherwise indicated.

C. Single Wythe Joint Reinforcement: Truss type; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

D. Strap Anchors: Bent steel shapes configured as required for specific situations, 1-1/4 in width, 0.105 in thick, lengths as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face, corrugated for embedment in masonry joint, hot dip galvanized to ASTM A 153/A 153M, Class B.

E. Wall Ties: Corrugated formed sheet metal, 7/8 inch wide by 0.05 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.

2.5 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.

B. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Clean reinforcement of loose rust.

C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

3.4 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.

B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

C. Remove excess mortar as work progresses.

D. Interlock intersections and external corners.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

G. Cut mortar joints flush where wall tile is scheduled, resilient base is scheduled, or cavity insulation vapor barrier adhesive is applied.

3.5 REINFORCEMENT AND ANCHORAGE

A. Reinforcement Bars: Secure at locations indicated and to avoid displacement during grouting. Minimum spacing between bars or to masonry surfaces shall be one bar diameter.

B. Joint Reinforcement: Install horizontal joint reinforcement 16 inches on center.

1. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
2. Place continuous joint reinforcement in first joint below top of walls.
3. Lap joint reinforcement ends minimum 8 inches.

C. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.

1. Bond Beams: At bond beams or other locations for horizontally reinforced masonry, provide special masonry units or saw to accommodate reinforcement.

3.7 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control and expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.8 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

3.9 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.10 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 00.

B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for conformance to requirements of this specification.

C. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314 and for flexural bond strength in accordance with ASTM C1072 or ASTM E518; perform tests and evaluate results.

3.11 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.12 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 27 31

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members, support members, suspension cables, sag rods, and struts.

B. Base plates, shear stud connectors and expansion joint plates.

C. Grouting under base plates.

1.2 RELATED REQUIREMENTS

A. Section 05 21 00 - Steel Joist Framing.

B. Section 05 31 00 - Steel Decking: Support framing for small openings in deck.

C. Section 09 90 00 Painting and Coating

1.3 REFERENCE STANDARDS

A. AISC 325	Steel Construction Manual; American Institute of Steel Construction, Inc.; 2011.
B. AISC S303	Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2005.
C. AISC S348	Specification for Structural Joints Using ASTM A325 or A490 Bolts; 2004.
D. ASTM A36/A36M	Standard Specification for Carbon Structural Steel; 2012.
E. ASTM A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
F. ASTM A325M	Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2013.
G. ASTM A500/A500M	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
H. ASTM A992/A992M	Standard Specification for Structural Steel Shapes; 2011.
I. ASTM C1107/C1107M	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2013.

J. ASTM E94	Standard Guide for Radiographic Examination; 2004 (Reapproved 2010).
K. ASTM E164	Standard Practice for Ultrasonic Contact Examination of Weldments; 2013.
L. ASTM E165/E165M	Standard Test Method for Liquid Penetrant Examination for General Industry; 2012.
M. ASTM E709	Standard Guide for Magnetic Particle Testing; 2008.
N. ASTM F1554	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2007a.
O. AWS A2.4	Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
P. AWS D1.1/D1.1M	Structural Welding Code - Steel; American Welding Society; 2010.
Q. IAS AC172	Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.
R. SSPC PA 1	Shop, Field, and Maintenance Painting of Steel; 2004.
S. SSPC PS 13.01	Epoxy Polyamide Painting System; 2004.
T. SSPC Paint 25	Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; 2004.
U. SSPC SP 3	Power Tool Cleaning; 2004.
V. SSPC SP 6/NACE No.3	Commercial Blast Cleaning; 2007.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 - Document Control.

B. Shop Drawings:
   1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
   2. Connections.
   3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
   4. Calculations for connections not detailed on drawings.

C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.5 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC "Steel Construction Manual."

B. Comply with Section 10 of AISC "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

C. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).

D. Design connections not detailed on the drawings under direct supervision of a Professional Engineer experienced in design of this work and licensed in Connecticut.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Angles and Plates: ASTM A36/A36M.

B. Steel W Shapes and Tees: ASTM A992/A992M.

C. Structural Tubing: ASTM A500/A500M, Grade B.

D. Sag Rods: ASTM A 36/A 36M.

E. High-Strength Structural Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, medium carbon, galvanized.

F. Headed Anchor Rods: ASTM F1554, Grade 55, plain.

G. Welding Materials: AWS D1.1; type required for materials being welded.

H. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C1107/C1107M and capable of developing a minimum compressive strength of 7,000 psi at 28 days.

I. Shop Primer: SSPC Paint 25, (alkyd primer) or SSPC PS 13.01 epoxy-polyamide, green primer (Form 150) type 1, except provide a Class B coating in accordance with AISC 325 for slip critical joints. Primer shall conform to Federal, State, and local VOC regulations. If flash rusting occurs, re-clean the surface prior to application of primer.

2.2 FABRICATION

A. Fabrication must be in accordance with the applicable provisions of AISC 325. Fabrication and assembly must be done in the shop to the greatest extent possible. Punch, subpunch and ream, or drill bolt holes perpendicular to the surface of the member.

B. Shop prime structural steel, except as modified herein, in accordance with SSPC PA 1. Do not prime steel surfaces embedded in concrete, galvanized surfaces, surfaces to receive sprayed-on fireproofing, or surfaces within 0.5 inch of the toe of the welds prior to welding (except surfaces on which metal decking is to be welded). Slip critical surfaces shall be primed with a Class B coating. Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the CTDOT Project Manager.

Clean to SSPC SP 6/NACE No.3, except steel exposed in spaces above ceilings, attic spaces, furred spaces, and chases that will be hidden to view in finished construction may be cleaned to SSPC SP 3 when recommended by the shop primer manufacturer. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.

Apply primer to a minimum dry film thickness of 2.0 mil except provide the Class B coating for slip critical joints in accordance with the coating manufacturer's recommendations. Repair damaged primed surfaces with an additional coat of primer.

2.3 GALVANIZING

A. ASTM A123/A123M or ASTM A153/A153M, as applicable, unless specified otherwise galvanize after fabrication where practicable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION

A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".

B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Field weld components indicated on drawings.

D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install snug-fit high-strength bolts in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

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

Bolted Parts:

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

Surface Conditions:

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

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

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

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

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

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

Installation:

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

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

applicable, and (3) the understanding and proper use by the bolting crew of the method of tensioning to be used.

To perform the calibrated wrench verification test for short grip bolts, direct tension indicators (DTI) with solid plates may be used in lieu of a tension measuring device. The DTI lot shall be first verified with a longer grip bolt in the tension measuring device. The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in Section 3.2.E(e) through 3.2.E(g), as applicable. The accuracy of the tension measuring device shall be confirmed by an approved testing agency at least annually.

Complete fastener assemblies with washers of size and quality specified, located as required below, shall be installed in properly aligned holes then tensioned and inspected by any of the methods described in Section 3.2.E(e) through 3.2.E(g) to at least the minimum tension specified in Table A. Tensioning may be done by turning the bolt while the nut is prevented from rotating when it is impractical to turn the nut. Impact wrenches, if used, shall be of adequate 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 brought to a snug condition. Snug is defined as having all the plies of the joint in firm contact. Bolt torquing to develop a snug condition shall progress systematically from the most rigid part of the connection to the free edges. The bolts of the connection shall then be retorqued in a similar manner as necessary until the connection is snug.

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

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

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

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

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

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

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

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

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

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

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

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

Torque $\leq$ 0.25 PD

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

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

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

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

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

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

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

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

- Where ASTM A325 bolts of any diameter or ASTM A490 bolts equal to or less than one inch in diameter are to be installed in a long slotted hole in an outer ply, a plate washer or

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

Turn-of-Nut Inspection Method:

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

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

Calibrated Wrench Inspection Method:

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

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

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

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

Direct Tension Indicator Inspection Method:

When Direct Tension Indicators (DTI) meeting the requirements of Subarticle M.06.02-5.1 are to be used with high-strength bolts to indicate bolt tension, they shall be subjected to the verification testing described in Section 3.2.E(g)(1) and installed in accordance with the method specified in Section 3.2.E(g)(2). Unless otherwise approved by the Engineer, the DTI shall be installed under the head of the bolt and the fastener assembly torqued by turning the nut. The manufacturer's recommendations shall be followed for the proper orientation of the DTI and additional washers, if any, required for the correct use of the DTI.

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

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

After the number of refusals is recorded at the verification load, the turned element shall be further torqued until the 0.005 inch feeler gage is refused at all the spaces and a visible gap exists in at least one space. The load at this condition shall be recorded and the bolt removed from the tension measuring device. The nut must be able to be turned down the bolt by hand for the complete thread length of the bolt excluding thread runout. If the nut cannot be rundown for this thread length, the DTI lot shall be rejected unless the load recorded is less than 95% of the average load measured in the rotational capacity test for the fastener lot as specified in Section 3.2.E(d)(2)(g).

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

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

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

TABLE A

Minimum Bolt Tension in kips*

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

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

TABLE B

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

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

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

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

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

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

TABLE C

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

F. Do not field cut or alter structural members without approval of Designer.

G. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

H. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

I. Material must be stored out of contact with ground in such manner and location as will minimize deterioration.

3.3 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

3.4 GALVANIZING REPAIR

A. Provide as indicated or specified. Galvanize after fabrication where practicable. Repair damage to galvanized coatings using ASTM A780/A780M zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

3.5 FIELD QUALITY CONTROL

A. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 10 percent of bolts at each connection.

B. Inspection of Pretensioned or Slip-Critical Bolts:

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

The Engineer shall determine that the requirements of Subarticles 3.4.B(2) and 3.4.B(3), following, are met in the work.

(2) Before the installation of fasteners in the work, the Engineer shall check the marking, surface condition and storage of fastener assemblies and the faying surfaces of joints for compliance with the requirements of Subarticles M.06.02-5, Section 3.2.E(a) and 3.2.E(d)(1). He shall observe calibration and/or testing procedures required in Section 3.2.E (e) through 3.2.E(g) as applicable, to confirm that the selected procedure is properly used and that, when so used with the fastener assemblies supplied, the tensions specified in Table A are provided. He shall monitor the installation of fasteners in the work to assure that the selected procedure, as demonstrated in the initial testing to provide the specified tension, is routinely properly applied.

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

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

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

C. Welded Connections: Visually inspect all field-welded connections and test at least 10 percent of welds using one of the following:

1. Radiographic testing performed in accordance with ASTM E94.
2. Ultrasonic testing performed in accordance with ASTM E164.
3. Liquid penetrant inspection performed in accordance with ASTM E165.
4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION 05 12 00

SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Open web steel joists, with bridging, attached seats and anchors.

B. Loose bearing members, such as plates or angles, and anchor bolts for site placement.

C. Supplementary framing for floor and roof openings greater than 18 inches.

1.2 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel Framing: Superstructure framing.

B. Section 05 31 00 - Steel Decking: Support framing for openings less than 18 inches in decking.

C. Section 09 90 00 Painting and Coating

1.3 REFERENCE STANDARDS

A.	AISC S348	Specification for Structural Joints Using ASTM A325 or A490 Bolts; 2004.
B.	ASTM A36/A36M	Standard Specification for Carbon Structural Steel; 2012.
C.	ASTM A153/A153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
D.	ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.
E.	ASTM E94	Standard Guide for Radiographic Examination; 2004 (Reapproved 2010).
F.	ASTM E164	Standard Practice for Contact Ultrasonic Testing of Weldments; 2013.
G.	ASTM E165/E165M	Standard Test Method for Liquid Penetrant Examination for General Industry; 2012.
H.	ASTM E709	Standard Guide for Magnetic Particle Testing; 2008.
I.	AWS D1.1/D1.1M	Structural Welding Code - Steel; American Welding Society; 2010.
J.	IAS AC172	Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.

K. SJI (SPEC) Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders; Steel Joist Institute; 2011.

L. SJI Technical Digest No. 9 Handling and Erection of Steel Joists and Joist Girders; Steel Joist Institute; 2008.

M. SSPC-Paint 25 Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings; 1997 (Ed. 2004).

N. SSPC-SP 2 Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.4 SUBMITTALS

A. See Section 01 33 00- Submittal Procedures and Section 01 33 00.13 - Document Control.

B. Shop Drawings: Indicate standard designations, joist coding, configurations, sizes, spacings, cambers, locations of joists, joist leg extensions, bridging, connections, and attachments.

C. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

D. Manufacturer's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.5 QUALITY ASSURANCE

A. Design connections not detailed on the drawings under direct supervision of a Professional Engineer experienced in design of this work and licensed in Connecticut.

B. Perform Work, including that for headers and other supplementary framing, in accordance with SJI Standard Specifications Load Tables and SJI Technical Digest No.9.

C. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Transport, handle, store, and protect products to SJI requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Open Web Joists: SJI Type LH Joists:
   1. Provide bottom chord extensions as indicated.
   2. Minimum End Bearing on Steel Supports: Comply with referenced SJI standards.

3. Minimum End Bearing on Masonry or Concrete Supports: Comply with referenced SJI standards.
4. Finish: Shop primed.

B. Nuts and Washers: ASTM A307, hot-dip galvanized per ASTM A153/A153M, Class C.

C. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A 36/A 36M.

D. Welding Materials: AWS D1.1; type required for materials being welded.

E. Shop and Touch-Up Primer: SSPC-Paint 25, zinc oxide, complying with VOC limitations of authorities having jurisdiction.

2.2 FINISH

A. Shop prime joists as specified.

B. Prepare surfaces to be finished in accordance with SSPC-SP 2.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.2 ERECTION

A. Erect joists with correct bearing on supports.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.

C. Coordinate the placement of anchors for securing loose bearing members furnished as part of the work of this section.

D. After joist alignment and installation of framing, field weld or bolt joist seats to steel bearing surfaces.

E. Position and field weld joist chord extensions and wall attachments as detailed.

F. Install supplementary framing for floor and roof openings greater than 18 inches.

G. Do not permit erection of decking until joists are braced bridged, and secured or until completion of erection and installation of permanent bridging and bracing.

H. Do not field cut or alter structural members without approval of joist manufacturer.

3.3 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 00.

B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 5 percent of bolts at each connection.

C. Welded Connections: Visually inspect all field-welded connections and test at least 5 percent of welds using one of the following:
   1. Radiographic testing performed in accordance with ASTM E94.
   2. Ultrasonic testing performed in accordance with ASTM E164.
   3. Liquid penetrant inspection performed in accordance with ASTM E165.
   4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION 05 21 00

SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Roof deck.

B. Metal form deck.

C. Supplementary framing for openings up to and including 18 inches.

D. Bearing plates and angles.

E. Metal deck accessories.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete topping over metal deck.

B. Section 05 12 00 - Structural Steel Framing: Support framing for openings larger than 18 inches and shear stud connectors.

C. Section 05 21 00 - Steel Joist Framing: Support framing for openings larger than 18 inches and shear stud connectors.

D. Section 09 90 00 Painting and Coating

1.3 REFERENCE STANDARDS

A. ASTM A36/A36M	Standard Specification for Carbon Structural Steel; 2012.
B. ASTM A653/A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
C. ASTM A1008/A1008M	Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2013.
D. AWS D1.1/D1.1M	Structural Welding Code - Steel; American Welding Society; 2010.
E. AWS D1.3	Structural Welding Code - Sheet Steel; American Welding Society; 2008.
F. IAS AC172	Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.

G. ICC-ES AC43 — Acceptance Criteria for Steel Deck Roof and Floor Systems; ICC Evaluation Service, Inc.; 2010 (R2013).

H. SDI (DM) — Publication No.31, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute; 2007.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittals Procedures and Section 01 33 00.13 - Document Control.

B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.

C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.

D. Certificates: Certify that products furnished meet or exceed specified requirements.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.5 QUALITY ASSURANCE

A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Engineer experienced in design of this work and licensed in Connecticut.

B. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.

B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 - PRODUCTS

2.1 STEEL DECK

A. All Deck Types: Select and design metal deck in accordance with SDI Design Manual.
   1. Calculate to structural working stress design and structural properties specified.
   2. Maximum Vertical Deflection of Roof Deck: 1/240 of span.
   3. Maximum Vertical Deflection of Form Deck: 1/360 of span.
   4. Maximum Lateral Deflection of Diaphragms: 1/500 of the height of the wall.

B. Roof Deck: Non-composite type, fluted steel sheet:

1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
3. Structural Properties:
   a. Span Design: Double, except over Stair/Elevator Shaft where Span Design is Single.
4. Minimum Metal Thickness, Excluding Finish: 20 gage.
5. Nominal Height: 1 1/2 inch except over Stair/Elevator shaft, where Nominal Height is 3 inch.

C. Metal Form Deck: Corrugated sheet steel, with provision for ventilation of concrete:

1. Ungalvanized Steel Sheet: ASTM A1008/A1008M, Designation SS, Grade 33, Type 1.
2. Minimum Metal Thickness, Excluding Finish: 20 gage.
3. Nominal Height: 2 inch.
4. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.

2.2 ACCESSORY MATERIALS

A. Bearing Plates and Angles: ASTM A36/A36M steel, unfinished.

B. Welding Materials: AWS D1.1.

C. Fasteners: Galvanized hardened steel, self tapping.

D. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.

1. Design Requirements for Sidelap Connections: Provide number and type of fasteners that comply with the applicable requirements of SDI design method for roof deck and floor deck applications and ICC-ES AC43.
2. Fasteners for Exposed Steel Roof Deck Application: Manufacturer's standard stainless steel with bonded neoprene washer.

E. Closure Plates for Concrete Form Decks: Support and retain concrete at each floor level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Provide metal closures for all openings in steel form deck ¼ inch and over.

F. Cover Plates: Sheet metal to close panel edge and end conditions, and where panels change direction or butt. Polyethylene-coated, self-adhesive, 2 inch wide joint tape may be provided in lieu of cover plates on flat-surfaced decking butt joints.

Fabricate cover plates for abutting floor deck units from the specified structural-quality steel sheets not less than nominal 18 gage thick before galvanizing. Provide 6 inch wide cover plates and form to match the contour of the floor deck units.

G. Miscellaneous Accessories: Furnish the manufacturer's standard accessories to complete the deck installation. Furnish metal accessories of the same material as the deck and with the minimum design thickness as follows: saddles, 0.0474 inch welding washers, 0.0598 inch cant strip, 0.0295 inch other metal accessories, 0.0358 inch unless otherwise indicated. Accessories must include but not be limited to saddles, welding washers, fasteners, cant strips, butt cover plates, underlapping sleeves, and ridge and valley plates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

B. On concrete and masonry surfaces provide minimum 4 inch bearing.

C. On steel supports provide minimum 1-1/2 inch bearing.

D. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods indicated on drawings.

E. At mechanically fastened male/female side laps fasten as specified on drawings.

F. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.

G. Weld deck in accordance with AWS D1.3.

H. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.

I. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

J. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION 05 31 00

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formed steel stud exterior wall framing.

1.2 RELATED REQUIREMENTS

A. Section 01 18 13 – Sustainable Design Requirements

B. Section 06 10 00 - Rough Carpentry: Wood blocking, exterior plywood wall sheathing, and miscellaneous framing.

C. Section 07 21 00 - Thermal Insulation: Insulation within framing members.

E. Section 09 21 16 - Gypsum Board Assemblies: Exterior Gypsum Sheathing.

1.3 **REFERENCE STANDARDS**

A. AISI SG02-1	North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
B. ASTM A153/A153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
C. ASTM A653/A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
D. ASTM 1003	Standard Specification for Steel Sheet, Carbon, Metallic and Non-Metallic Coated for Cold-Formed Framing Members
E. ASTM C955	Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.
F. ASTM C1007	Standard Specification for Installation of Load Bearing, (Transverse and Axial) Steel Studs and Related Accessories.
G. AWS D1.1/D1.1M	Structural Welding Code - Steel; American Welding Society; 2010.
H. AWS D1.3	Structural Welding Code-Sheet Steel.

I. SSPC-Paint 20 Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.5 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 - Document Control.

B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, and limitations.

C. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.

1. Indicate stud layout.
2. Provide design engineer's stamp on shop drawings.
3. Provide calculations for loadings and stresses of specially fabricated framing, stamped by a Professional Engineer.
4. Provide details and calculations for factory-made framing connectors, stamped by a Professional Engineer.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design framing system under direct supervision of a Professional Engineer experienced in design of this Work and licensed in Connecticut.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Framing:

1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
2. Marino: www.marinoware.com.
3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Framing Connectors and Accessories:

1. Same manufacturer as metal framing.

2. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

B. Design Criteria: Structural drawings contain details of exterior Cold-Formed Steel Structural Members. If any alterations are desired by the trade contractor or further design must be performed for interior framing, it shall be done following to the following design criteria:

1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI SG02-1 North American Specification for the Design of Cold-Formed Steel Structural Members.

2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.

3. Design Loads: In accordance with applicable codes.

4. Live load deflection meeting the following, unless otherwise indicated:

a. Exterior Walls: Maximum horizontal deflection under wind load of 1/180 of span.

5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

7. Design any necessary connections between cold formed metal framing members, connections to structural steel, and connections to concrete or masonry.

8. Sheathing of exterior walls shall be 5/8” exterior gypsum sheathing. This may be included in calculations.

9. Provide appropriate relief details at control joints shown in structure.

2.3 FRAMING MATERIALS

A. Studs and Track: ASTM A-1003; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.

1. Gage and depth: As indicated on Structural drawings with yield strength 50 Ksi.

2. Galvanized in accordance with ASTM A653/A653M G90/Z275 coating.

B. Framing Connectors: Factory-made, formed steel sheet.

1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for thicknesses less than 10 gage (0.118 inch), and factory punched holes and slots.

2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI SG02-1 North American Specification for the Design of Cold Formed Steel Structural Members.

3. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.

a. Where continuous studs bypass elevated floor slab, connect stud to slab in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.

b. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.

c. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

d. Provide top track with long leg track and head of wall movement connectors; minimum track length of 12 feet.

2.5 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

B. Plates, Gussets, Clips: Formed Sheet Steel, thickness determined for conditions encountered; finish to match framing components.

C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.6 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.

B. Anchorage Devices: Powder actuated.

C. Welding: In conformance with AWS D1.1.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building framing components are ready to receive work.

B. Verify field measurements and adjust installation as required.

3.2 INSTALLATION OF STUDS

A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.

B. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.

C. Install intermediate studs above and below openings to align with wall stud spacing.

D. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.

E. Attach cross studs to studs for attachment of fixtures anchored to walls.

F. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

G. Touch-up field welds and damaged galvanized surfaces with primer.

END OF SECTION 05 40 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Shop fabricated steel items.

1.2 RELATED REQUIREMENTS

A. Section 01 18 13 – Sustainable Design Requirements

B. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

C. Section 04 27 31 - Reinforced Unit Masonry: Placement of metal fabrications in masonry.

D. Section 05 12 00 - Structural Steel Framing: Structural steel column anchor bolts.

E. Section 05 21 00 - Steel Joist Framing: Structural joist bearing plates, including anchorage.

F. Section 05 31 00 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.

G. Section 05 51 00 – Metal Stairs

H. Section 05 52 13 - Pipe and Tube Railings.

I. Section 09 90 00 - Painting and Coating: Paint finish.

1.3 REFERENCE STANDARDS

A. ANSI A14.3	American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.
B. ASTM A36/A36M	Standard Specification for Carbon Structural Steel; 2012.
C. ASTM A53/A53M	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
D. ASTM A123/A123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
E. ASTM A153/A153M-	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
F. ASTM A283/A283M	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

G. ASTM A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
H. ASTM A325M	Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2013.
I. ASTM A500/A500M	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
J. AWS A2.4	Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
K. AWS D1.1/D1.1M	Structural Welding Code - Steel; American Welding Society; 2010.
L. IAS AC172	Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.
M. SSPC-Paint 15	Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
N. SSPC-Paint 20	Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).
O. SSPC-SP 2	Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 – Document Control.

B. See Section 01 81 13 – Sustainable Design Requirements.

C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

D. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).

PART 2 - PRODUCTS

2.1 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.

C. Plates: ASTM A283.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.

F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FABRICATED ITEMS

A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
   1. Side Rails: 3/8 x 2 1/2 inches members spaced at 24 inches.
   2. Rungs: 3/4 inch diameter solid round bar spaced 12 inches on center. 24 inches wide with knurled texture for slip resistance.
   3. Space rungs 7 inches from wall surface at ladder to roof hatch. For elevator pit ladder see drawings.

B. Lintels: As detailed; galvanized finish.

C. Door Frames for Overhead Door Openings: Bent plate sections with galvanized finish.

D. Elevator Hoistway Beams: Beam sections; prime paint finish.

E. Bollards: Steel pipe, concrete filled, as detailed, prime paint finish.

2.4 FINISHES - STEEL

A. Prime paint all steel items.
   1. Exceptions: Galvanize items to be embedded in concrete and items to be imbedded in masonry.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements.

2.5 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 05 50 00

SECTION 05 51 00 - METAL STAIRS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Stairs with concrete treads.

B. Structural steel stair framing and supports.

C. Handrails and guards.

D. Landings.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 Cast-in-Place Concrete: Concrete fill in stair pans.

B. Section 04 27 31 Reinforced Unit Masonry: Placement of metal fabrications in masonry.

C. Section 05 50 00 Metal Fabrications.

D. Section 05 52 13 Pipe and Tube Railings: Exterior Metal handrails and guards other than specified in this section.

E. Section 09 90 00 Painting and Coating: Paint finish.

1.3 REFERENCE STANDARDS

A. AISC 201 AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.

B. ASTM A6/A6M Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2012.

C. ASTM A36/A36M Standard Specification for Carbon Structural Steel; 2012.

D. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

E. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

F. ASTM A283/A283M Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

G. ASTM A325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.

H. ASTM A325M Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2013.

I. ASTM A1011/A1011M (2012b) Standard Specification for Steel, Sheet, and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability and Ultra-High Strength

I. AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.

J. AWS D1.1/D1.1M Structural Welding Code - Steel; American Welding Society; 2010.

K. SSPC-Paint 15 Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).

L. SSPC-SP 2 Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.4 SUBMITTALS

A. Section 01 18 13 – Sustainable Design Requirements.

B. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 – Document Control.

C. Shop Drawings and Calculations for Stairs and Railings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage to structure, size and type of fasteners, and accessories for stairs, landings and railings.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
2. Include the structural design engineer's stamp or seal on each sheet of shop drawings and calculations.

D. Welders' Certificates.

E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.

1.5 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Engineer experienced in design of this work and licensed in Connecticut, or personnel under direct supervision of such an engineer.

B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

C. Fabricator Qualifications:

1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
2. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Unit Stair Towers:
1. Alfab, Inc.: www.alfabinc.com.
2. American Stair, Inc.: www.americanstair.com.
3. Pacific Stair Corporation: www.pacificstair.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
2. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
3. Dimensions: As indicated on drawings.
4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
6. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:
1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
a. Welded Joints: Continuously welded and ground smooth and flush.
b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
c. Exposed Edges and Corners: Eased to small uniform radius.
d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.

C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.3 METAL STAIRS WITH CONCRETE TREADS

A. Jointing and Finish Quality Level: Architectural, as defined above.

B. Risers: Closed.

C. Treads: Metal pan with field-installed concrete fill.
   1. Concrete Depth: 1-1/2 inches, minimum.
   2. Tread Pan Material: Steel sheet.
   3. Tread Pan Thickness: As required by design; 0.1084 inch (12 gage) minimum.
   4. Pan Anchorage to Stringers: Welded to carrier angles welded to stringers.
   5. Concrete Reinforcement: None.
   6. Concrete Finish: For resilient floor covering.

D. Risers: Same material and thickness as tread pans.
   1. Nosing Depth: Not more than 1-1/2 inch overhang.
   2. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.

E. Stringers: Rolled steel channels.
   1. Stringer Depth: 12 inches.
   2. End Closure: Sheet steel of same thickness as risers welded across ends.

F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.

G. Railings: Steel pipe railings.

H. Finish: Shop- or factory-prime painted.

I. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.4 HANDRAILS AND GUARDS

A. Wall-Mounted Handrails: Round pipe or tube rails unless otherwise indicated.
   1. Outside Diameter: 1-1/2 inches.

B. Guard-Mounted Handrails: Similar to Wall-mounted and as indicated on drawings.

C. Guards:
   1. Top and Bottom Rails: Round pipe or tube rails unless otherwise indicated.
      a. Outside Diameter: 1-1/2 inches.
   2. Infill at Picket Railings: Vertical pickets.
      a. Horizontal Spacing: Maximum 4 inches on center.
      b. Material: Solid steel bar.

c. Shape: Square.

d. Size: 3/4 inch square.

e. Top Mounting: Welded to underside of top rail.

f. Bottom Mounting: Welded to bottom rail.

3. End and Intermediate Posts: Same material and size as top rails.

a. Horizontal Spacing: As indicated on drawings.

b. Mounting: Welded to top surface of stringer.

2.5 MATERIALS

A. Steel Sections: ASTM A 36/A 36M.

B. Steel Plates: ASTM A6/A6M, ASTM A36, or ASTM A283/A283M.

C. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

D. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.

1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).

E. Concrete Fill: Type specified in Section 03 30 00.

F. Steel Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.

G. Welding Materials: AWS D1.1; type required for materials being welded.

H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.6 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime Painting: Use specified shop- and touch-up primer.

1. Preparation of Steel: In accordance with SSPC-SP 2, Hand Tool Cleaning.

2. Number of Coats: One.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Provide welded field joints where specifically indicated on shop drawings. Perform field welding in accordance with AWS D1.1.

E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

F. Obtain approval from Engineer of Record prior to site cutting or creating adjustments not scheduled.

G. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.3 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION 05 51 00

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior stair, ramp and loading dock railings and guardrails.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 09 90 00 - Painting and Coating: Paint finish.

1.3 REFERENCE STANDARDS

A.	AISC 201	AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.
B.	ASTM A153/A153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
C	ASTM A123/A123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
D.	ASTM E985	Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
E.	AWS A2.4	Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
F.	SSPC-Paint 15	Steel Joist Shop Paint; 1999 (Ed. 2004).
G.	SSPC-Paint 20	Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
H.	SSPC-SP 2	Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.4 SUBMITTALS

A. Section 01 18 13 – Sustainable Design Requirements.

B. See Section 01 33 00 -Submittal Procedures and Section 01 33 00.13 – Document Control.

C. Shop Drawings and Calculations for Railings and Guardrails: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

2. Include the structural design engineer's stamp or seal on each sheet of shop drawings and calculations.

D. Welder's Certificates

E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.

1.5 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in Connecticut, or personnel under direct supervision of such an engineer.

B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

C. Fabricator Qualifications:

1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
2. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 - PRODUCTS

2.1 RAILINGS AND GUARDRAIL - GENERAL REQUIREMENTS

A. Design and fabricate, railing and guardrail assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

B. Allow for expansion and contraction of members and building movement without damage to connections or members.

C. Dimensions: See drawings for configurations and heights.

D. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

2.2 MATERIALS

A. Pipe: ASTM A 153/A 153M, Grade B Schedule 40.

B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

C. Galvanizing: In accordance with requirements of ASTM A123/A123M.

1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.3 HANDRAILS AND GUARDS

A. Post-Mounted Handrails: Round pipe or tube rails unless otherwise indicated.

1. Outside Diameter 1-1/2 inches.

B. Guard-Mounted Handrails: Similar to post-mounted and as indicated on drawings.

C. Guards:

1. Top and Bottom Rails: Round pipe or tube rails unless otherwise indicated.
   a. Outside Diameter: 1-1/2 inches.
2. Infill at Picket Railings: Vertical pickets.
   a. Horizontal Spacing: Maximum 4 inches on center.
   b. Material: Solid steel bar.
   c. Shape: Square.
   d. Size: 3/4 inch square.
   e. Top Mounting: Welded to underside of top rail.
   f. Bottom Mounting: Welded to bottom rail.
3. End and Intermediate Posts: Same material and size as top rails.
   a. Horizontal Spacing: As indicated on drawings.
   b. Mounting: Welded to top surface of stringer.

2.4 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured.

D. Welded Joints:

1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.5 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime Painting: Use specified shop- and touch-up primer.
1. Preparation of Steel: In accordance with SSPC-SP 2, Hand Tool Cleaning.
2. Number of Coats: One.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

B. Anchor railings and guardrails securely to structure, and as indicated on drawings..

3.4 TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset from True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 05 12 13

SECTION 05 53 05 - METAL GRATINGS AND FLOOR PLATES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Formed metal floor gratings for elevator sump pit cover.

1.2 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications.

B. Section 09 90 00 - Painting and Coating: Field paint finish.

1.3 REFERENCE STANDARDS

A. ASTM A36/A36M Standard Specification for Carbon Structural Steel; 2012.

B. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.

C. AWS D1.1/D1.1M Structural Welding Code - Steel; American Welding Society; 2010.

D. NAAMM MBG 531 Metal Bar Grating Manual; The National Association of Architectural Metal Manufacturers; 2009 (ANSI/NAAMM MBG 531).

E. SSPC-Paint 20 Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.4 PERFORMANCE REQUIREMENTS

A. Design Live (Pedestrian) Load: Uniform load of 100 lb/sq ft minimum; concentrated load of 300 lbs.

B. Maximum Allowable Deflection Under Live Load: 1/240 of span; size components by single support design.

1.5 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures and Section 01 33 00.13 – Document Control.

B. Shop Drawings: Indicate details of component supports, openings, perimeter construction details, and tolerances.

C. Manufacturer's Installation Instructions: Indicate special requirements for opening and perimeter framing. Provide manufacturer’s standard cast-in-place grating frame.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel For Welding or Riveting: ASTM A36/A36M, galvanized, of rectangular shape.

B. Steel Framing: ASTM A36/A36M shapes, unfinished.

C. Welding Materials: AWS D1.1; type required for materials being welded.

D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

A. Fabricate grates to accommodate design loads.

B. Fabricate support framing for openings.

2.3 FINISHES

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Galvanizing for Steel Shapes: ASTM A123/A123M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated on shop drawings.

B. Verify that opening sizes and dimensional tolerances are acceptable.

C. Verify that supports are correctly positioned.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions.

B. Place frames in correct position, plumb and level.

C. Mechanically cut galvanized finish surfaces. Do not flame cut.

3.3 TOLERANCES

A. Conform to NAAMM MBG 531.

END OF SECTION 05 53 05