UCONN

PROCUREMENT SERVICES

CAPITAL PROJECTS AND
FACILITIES PROCUREMENT

PROJECT MANUAL

FOR

FINE ARTS AIR CONDITIONING

UNIVERSITY OF CONNECTICUT

STORRS CAMPUS
Storrs, Connecticut

PROJECT NUMBER: FO500088

February 21, 2020

ARCHITECT/ENGINEER OF RECORD:

VAN ZELM ENGINEERS

UNIVERSITY OF CONNECTICUT
FINE ARTS AIR CONDITIONING
PROJECT #FO500088

The following Bid Documents and all Bid Clarifications are to be obtained by accessing the following web link and clicking on the Project Number: FO500088
http://cpca.uconn.edu/construction-current-opportunities-open-bids/

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INVITATION TO BID
February 20, 2020

DUE DATE: **March 24, 2020**
TIME: **2:00 p.m.**
LOCATION: **University of Connecticut**
Capital Projects & Facilities Procurement
3 Discovery Drive, Unit 6076
Storrs, CT 06269
Attn: Walt Dalia

(Sealed Bids – Faxed Bids will not be accepted)

The University of Connecticut is accepting sealed bids for:

Fine Arts Air Conditioning
Project Number: FO500088
University of Connecticut
Storrs, CT

Bids must be submitted on the forms supplied and in the manner specified within the Bid Documents. The invitation is open to **On-Call Trade HVAC Contractors ($100K - $500K) only**.

PROJECT DESCRIPTION

The Work of Project is defined by the Contract Documents and consists of the following:
Provide air conditioning for 2 Rehearsal Classrooms and 1 Work Room in Building C, including modifications of the existing mechanical, plumbing and electrical systems to accommodate the new equipment.

PROJECT DURATION

The construction start date is May of 2020 with a project duration of three (3) months.

PRE-BID CONFERENCE

There will be a job-site walkthrough on **Monday, March 2, 2020 at 9:00 a.m.** This walkthrough is ***not mandatory*** however; interested bidders are ***strongly encouraged*** to attend to view existing conditions. Meet at the **Purchasing Conference Room, 3 Discovery Drive, Storrs, Connecticut.** The Pre-Bid Conference will commence promptly at the time noted herein. There are limited short-term visitor parking spaces around the Purchasing Building. The North Parking

REQUEST FOR INFORMATION PROCEDURE:
All Requests for Information ("RFI") must be received in writing no later than **2:00 p.m. on Friday, March 13, 2020** and emailed to walter.dalia@uconn.edu using the RFI form included within the bid documents. Include in the subject line: RFI – Fine Arts Air Conditioning, #FO500088. **Questions received verbally will not be answered.** All answers will be published by written Bid Clarification. Extensions of RFI deadlines may only be revised via written Bid Clarification. It is the responsibility of all bidders to verify that they are current with all Bid Clarifications issued prior to bid submission.

Bids will be accepted at the Office of Capital Projects and Facilities Procurement, 3 Discovery Drive, Storrs, CT 06269 until 2:00 p.m. local time on Tuesday, March 24, 2020 at which time they will be publicly opened and read.

The Bid shall be accompanied by a Bid Bond in the amount of ten percent (10%) of the amount bid. All bonds required for this Project shall be acceptable to the University and, as a minimum, issued through a bonding company licensed to transact such business in the State of Connecticut and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the "Treasury Department Circular 570".

The "Set-Aside" for this project is that (1) not less than thirty (30%) of the total Contract Price be awarded to subcontractors who are certified by the Connecticut Department of Administrative Services as "Small Business Enterprises" ("SBEs") and (2) not less than ten (10%) of the total Contract Price be awarded to subcontractors who are certified by the Connecticut Department of Administrative Services as "Minority Business Enterprises" ("MBEs") (the 10% set aside for MBEs may be included in the 30% set aside for SBEs). The general contractors are responsible for ensuring that they and the SBEs they have selected are eligible contractors, and that they meet State requirements.

The University of Connecticut is committed to increasing participation and enrollment of Small and Minority Businesses (S/MBE's) on our contracts. It is expected that those contracting with us will give thoughtful consideration both to the approach they use in their selection of the eligible Connecticut-certified S/MBE's that they will utilize and in the maximizing of contracting and work opportunities for S/MBE's. To ensure that you are exploring all possible ways to be inclusive, included below is a sample of specific possibilities for breakout of the schedule of values. We appreciate your partnering with us to ensure that S/MBE's are given an opportunity to work, contribute and grow their businesses on University projects.

Specific possibilities for Inclusion of S/MBE's in the Schedule of Values
*Bold indicates suggested categories (if applicable)

01 – General Conditions	**Temporary Electric & Lighting** **Cleaning**
02 – Existing Conditions	**Demolition & Salvage** **Abatement**
03 – Concrete	**Sidewalks & Flatwork**
05 - Metals	**Metal Stairs & Railings** **Miscellaneous Metals** **Decorative Metal**
06 – Woods Plastics & Composites	**Rough Carpentry & Blocking**
07 – Thermal & Moisture Protection	**Insulation** **Sealers & Waterproofing**
08 – Openings	**Door Hardware**
09 – Finishes	**Tile Installations** **Acoustic Ceilings** **Flooring Installations** **Painting & Coatings** **Firestopping**
10 – Specialties	**Signage**
12 – Furnishings	**Window Treatments**
14 – Conveying Equipment	**Lifts**
23 – HVAC (Heating, Ventilating, Air	**HVAC Duct Insulation**

Conditioning)	
27 – Communications	**Low Voltage Cabling**
28 – Electronic Safety & Security	**Fire Alarm & Security Wiring**
32 – Exterior Improvements	**Retaining Walls** **Paving** **Fencing & Gates** **Landscaping**
44 – Pollution & Waste Control Equipment	**Trucking**

The University reserves the right to reject any or all Bids, in whole or in part, to award any item, group of items, or total Bid, and to waive any informality or technical defects, if it is deemed to be in the best interests of the University.

No Bidder may withdraw its Bid within **ninety (90) days** of the date of the Bid opening. Should there be reasons why the Contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the University and the Bidder.

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Walt Dalia
Purchasing Agent II
Capital Projects and Facilities Procurement

On-Call Trade HVAC Contractor
$100K - $500K

Project #OC.HVAC.2018
Prequalified Contractors

1	**Action Air Systems, Inc.** Manchester, CT
2	**Air Temp Mechanical Services, Inc.** Southington, CT
3	**All State Construction, Inc.** Farmington, CT
4	**Ferguson Mechanical Company, Inc.** Plainville, CT
5	**Modern Mechanical Systems, Inc.** Farmington, CT
6	**Rivco Construction, LLC** Burlington, CT
7	**SAV-MOR Cooling & Heating, Inc.** Southington, CT

INSTRUCTIONS TO PREQUALIFIED BIDDERS

ARTICLE 1 GENERAL PROVISIONS

1.1 Connecticut Sales and Use Tax

1.1.1 The University of Connecticut is a tax-exempt institution. The Contractor shall be familiar with the current regulations of the Department of Revenue Service. The tax on materials or supplies exempted by such regulations shall not be included as part of the Bid. A Sales Tax Certificate is available from the Purchasing Department upon written request.

1.2 Contractor's Qualifications

In the Pre-Qualification to Bid Documents for this project, the University has reserved the right to request additional information from prospective Bidders beyond what may have been submitted in any Application and Statement of Qualifications in response to the Invitation to Pre-Qualify. The University has also reserved the right to find any Bidder to be non-responsible with respect to a specific project notwithstanding the fact that the Bidder may have previously been pre-qualified pursuant to the pre-qualification process. The University reaffirms these reservations of rights. In finding that a Bidder is non-responsible, the University may rely upon any information obtained prior to or subsequent to a finding that Bidder is pre-qualified.

1.2.1 CGS 4b-91 requires each bid submitted shall include a copy of a prequalification certificate issued by the Commissioner of Administrative Services. The bid shall also be accompanied by an update bid statement in such form as the Commissioner of Administrative Services prescribes. The form for such update bid statement shall provide space for information regarding all projects completed by the bidder since the date the bidder's prequalification certificate was issued or renewed, all projects the bidder currently has under contract, including the percentage of work on such projects not completed, the names and qualifications of the personnel who will have supervisory responsibility for the performance of the contract, any significant changes in the bidder's financial position or corporate structure since the date the certificate was issued or renewed, any change in the contractor's qualification status as determined by the provisions of subdivision (6) of subsection (c) of section 4a-100 and such other relevant information as the Commissioner of Administrative Services prescribes. Any bid submitted without a copy of the prequalification certificate and an update bid statement shall be invalid and considered non-responsible.

1.3 Academic Schedule

1.3.1 It is important to the University, in order to maintain the integrity of its ongoing academic activities, that its rules and regulations and the requirements of the Contract Documents, regarding noise control, traffic control etc. and other matters which may affect its operations be strictly adhered to, and that its academic schedule be maintained. Therefore, all Bidders shall familiarize themselves with and comply with the academic schedule of the University, and its regulations regarding noise, traffic, etc. which are available from Architectural and Engineering Services. No noise generating work shall be allowed during exam periods where the noise will impact classroom functions. Examples of noise generating work include, but are not limited to, sawing, drilling, and hammering/jackhammering. The Contractor shall keep the

University Representative informed as to the location of its operations to enable necessary precautions or co-ordination to be implemented.

1.4 Non-Discrimination and Affirmative Action Provisions

1.4.1 Non-discrimination. References in this section to "Contract" shall mean the execution of AIA 101 or Purchase Order Contract; and references to "Contractor" shall mean the person or entity who will be solely responsible for execution of the work.

(a) The following subsections are set forth here as required by section 4a-60 of the Connecticut General Statutes:

(1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the state of Connecticut. The Contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved; (2) the Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the commission; (3) the Contractor agrees to provide each labor union or representative of workers with which such Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such Contractor has a contract or understanding, a notice to be provided by the commission advising the labor union or workers' representative of the Contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the Contractor agrees to comply with each provision of this section and sections 46a-68e and 46a-68f and with each regulation or relevant order issued by said commission pursuant to sections 46a-56, 46a-68e and 46a-68f; (5) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this section and section 46a-56.

(b) If the Contract is a public works contract, the Contractor agrees and warrants that he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works project.

(c) "Minority business enterprise" means any small contractor or supplier of materials fifty-one per cent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) Who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise and (3) who are members of a minority, as such term is defined in subsection (a) of section 32-9n; and "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. "Good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements.

(d) Determination of the Contractor's good faith efforts shall include but shall not be limited to the following factors: The Contractor's employment and subcontracting policies, patterns and practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

(e) The Contractor shall develop and maintain adequate documentation, in a manner prescribed by the commission, of its good faith efforts.

(f) The Contractor shall include the provisions of sections (a) and (b) above in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the state and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with section 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the commission, the Contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

(g) The following subsections are set forth here as required by section 4a-60a of the Connecticut General Statutes:

(1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or of the state of Connecticut, and that employees are treated when employed without regard to their sexual orientation; (2) the Contractor agrees to provide each labor union or representative of workers with which such Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such Contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the Contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (3) the Contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said commission pursuant to section 46a-56; and (4) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor which relate to the provisions of this section and section 46a-56.

(h) The Contractor shall include the provisions of section (g) above in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the state and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with section 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the commission, the Contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

(i) For the purposes of this entire Non-Discrimination section, “Contract” or "contract" includes any extension or modification of the Contract or contract, “Contractor” or "contractor" includes any successors or assigns of the Contractor or contractor, "marital status" means being single, married as recognized by the state of Connecticut, widowed, separated or divorced, and "mental disability" means one or more mental disorders, as defined in the most recent edition of the American Psychiatric Association's "Diagnostic and Statistical Manual of Mental Disorders", or a record of or regarding a person as having one or more such disorders. For the purposes of this section, "Contract" does not include a contract where each contractor is (1) a political subdivision of the state, including, but not limited to, a municipality, (2) a quasi-public agency, as defined in Conn. Gen. Stat. Section 1-120, (3) any other state, including but not limited to any federally recognized Indian tribal governments, as defined in Conn. Gen. Stat. Section 1-267, (4) the federal government, (5) a foreign government, or (6) an agency of a subdivision, agency, state or government described in the immediately preceding enumerated items (1), (2), (3), (4) or (5).

1.5 Union Labor

1.5.1 Attention is called to the fact that there may be construction work now being carried on at the site at which this construction is contemplated being done by UNION LABOR. This fact must be kept in mind by all Bidders submitting proposals for this work.

1.6 Labor Market Area

1.6.1 All Bidders shall have read Sections 31-52 and 31-52a of the Connecticut General Statutes, as amended. These references relate to the preference of State citizens, the preference of residents of the labor market area in which the work under the Contract is to be done and the penalties for violations.

1.7 Wage Rates

1.7.1 If this project involves new construction of a building or other structure or improvement, and the total cost of all Work to be performed by Contractors and Subcontractors is $400,000.00 or more, or if the project involves remodeling, refurbishing, rehabilitation, alteration or repair of a building or other structure or improvement, and such total cost is $100,000.00 or more, then:

.1 The wages paid on an hourly basis to any mechanic, laborer or workman employed upon the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such employee to any employee welfare fund as defined in Subsection (h) of Section 31-53 of the Connecticut General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such project is being constructed. Any Contractor who is not obligated by agreement to make payment or contribution on behalf of such employees to any such employee welfare fund shall pay to each employee as part of his wages the amount of payment or contribution for his classification on each payday.

1.7.2 The State of Connecticut Labor Department Wage Rate Schedule, when required by the University, shall be provided with these documents or will be issued as part of the bid documents or by Bid Clarification/Addendum hereto and is deemed to reflect such customary

or prevailing wages for this project, and is hereby incorporated and made a part of the Contract Documents.

1.7.3 Each contractor who is awarded a contract on or after October 1, 2002 shall be subject to provisions of the Connecticut General Statutes, Section 31-53 as amended by Public Act 02-69, "An Act Concerning Annual Adjustments to Prevailing Wages".

1.7.4 Wage Rates will be posted each July 1st on the Department of Labor Website: www.ctdol.state.ct.us. Such prevailing wage adjustment will not be considered a matter for an annual contract amendment.

1.7.5 Wage rates shall be paid pursuant to Section 31-53 and 31-54 of the Connecticut General Statutes, and any regulations issued hereunder.

1.7.6 **Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions.** (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268. (b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance.

ARTICLE 2 BIDDERS' REPRESENTATIONS

2.1 The amount of each Bid shall be deemed to include the entire cost and expense of every item of labor, material and overhead necessary to complete the work bid upon, as specified, in full detail ready for use. The risk of all such costs and expenses shall be deemed assumed by the successful Bidder. The University shall assign a University Representative to work with the successful Contractor as a liaison.

2.2 In performing its obligations under this Contract, the Contractor agrees to comply with all applicable states, laws, ordinances, regulations, codes, rules or orders of, or issued by, any governmental body having jurisdiction over the work, location of the work or contract.

ARTICLE 3 BIDDING DOCUMENTS

3.1 Bid Clarifications, Addenda and Interpretations

3.1.1 No interpretations of the meaning of the Drawings, specifications or other Contract Documents will be made orally to any Bidder. Every request for such interpretation must be

made in writing to the University Office of Capital Project & Contract Administration, and to be given consideration shall be received at the specified date outlined within the invitation to bid and/or adjusted by a bid clarification/addenda.

3.1.2 Any and all such interpretations and any supplemental instructions will be in the form of written bid clarification/addenda which, if issued, will be posted on the University's Capital Projects and Contract Administration's Department website; www.cpca.uconn.edu for all prospective Bidders to access or for those without access to a computer you can obtain them through Joseph Merritt, no later than five (5) days prior to the date fixed for the opening of Bids. Failure of any Bidder to receive any such addendum or interpretation shall not release any Bidder from any obligations under his Bid as submitted, provided notice has been sent to the address furnished by such prospective Bidder for the transmittal of notices, addenda and interpretations. It shall be the Bidder's responsibility to make inquiry as to, and to obtain, the Addenda issued, if any.

3.1.3 The number of days shown in 3.1.1 and 3.1.2 may differ from the actual dates given in an Agenda for a Pre-Bid or Pre-Proposal Conference, if so, the number of days listed are, hereby, superseded by the Agenda dates, unless the Bid or Proposal is extended by Addendum, in which case the number of days will again apply unless stated differently in the Addendum.

3.1.4 Bidders shall promptly notify the University of any ambiguity, inconsistency or error which they may discover upon examination of these Contract Documents.

ARTICLE 4 BIDDING PROCEDURES

4.1 Requests for Information

4.1.1 Enclosed with this Invitation to Submit Proposals Manual is a Request for Information Form (RFI). All questions/clarifications must be submitted in writing on this form and before the prescribed RFI Deadline. No verbal questions will be answered. All answers to RFI's will be issued in a Bid Clarification/Addenda. Form is at the end of this document.

4.2 Form of Proposal

4.2.1 Enclosed with this Invitation to Submit Proposals Manual is a Form of Proposal. Bids shall be submitted on a copy of this form. Additional instructions to bidders including information on submission of bids and award and Contract appear on this form. All documents required by these Bid Documents must be returned with your Bid.

4.3 Bids and Rejection of Bids

4.3.1 General Bids shall be for the complete work as specified and shall include the names of any Subcontractors for the classes of work specified in the Form of Proposal, and for each other class of work for which the University has required a separate section and the dollar amounts of their subcontracts, and the General Contractor shall be selected on the basis of such general Bids. It shall be presumed that the general Bidder intends to perform with its own employees all work in such four classes and such other classes, for which no Subcontractor is named. The general Bidder's qualifications for performing such work shall be subject to review by the University pursuant to the Bid and the Contract Documents.

4.3.2 Bids shall be submitted only on the forms furnished for the specific project, which shall include a completed Form of Proposal containing all information required on the Proposal form, executed with an original signature by a duly authorized officer or representative of the Bidder, and, in the case of a Joint Venture, by duly authorized representatives of each Joint Venture. In no event will Bids or changes in Bids made by telephone, email or fax be considered. Any Form of Proposal omitting or adding items, altering the form, containing conditional or alternative Bids, or without the original signature of the Bidder or its authorized representative, may be rejected.

4.3.3 Any Bids received after the scheduled closing time for the receipt of Bids will be returned to the Bidders unopened.

4.3.4 Any Bid once deposited with the University of Connecticut may only be withdrawn by letter of request, signed by the depositing Bidder and presented to the Office of Capital Project and Contract Administration, prior to the time of opening of any Bid for the project designated or identified project.

4.4 Bid Security

4.4.1 Each Bid must be accompanied by a certified check payable to the order of the University of Connecticut, or the Bid may be accompanied by a Bid Bond in the form required by the University, having as surety thereto such surety company or companies acceptable to the University and as are authorized to do business in this State, for an amount not less than 10 per cent of the Bid. All checks submitted by unsuccessful Bidders shall be returned to them after the Contract has been awarded. Bid Security is not required for projects under $50,000.00.

4.4.2 Failure of the successful Bidder to file the required Performance and Labor & Material bonds shall be just cause for the amount of the security deposited with the Bid to be forfeited, any part of the whole of which may be used to make up the difference between the Bid of the defaulting Bidder and the Bid of the next lowest responsible qualified Bidder to whom the work is finally awarded. Failure to execute a contract after award as specified and Bid shall also result in the forfeiture of such Bid Bonds or Certified Check.

4.5 Subcontractors

4.5.1 The Contractor shall not contract with a person or entity who appears on the State of Connecticut Debarment List, the Federal Davis Bacon Act Debarment List, both of which are available through: **http://ctdol.state.ct.us** or the Federal List of Excluded Parties Listing System available through: **http://epls.arnet.gov**

4.5.2 The Bidder shall furnish, with his submitted Bid, as is set forth in the Proposal Form, in the space provided for such purpose, the names and prices of responsible and qualified Subcontractors who are actually to perform the following categories of work under the Base Bid, if their prices exceed $25,000.00:

.1 Masonry

.2 Electrical
.3 Mechanical other than HVAC
.4 HVAC
.5 Any other class of work identified in the Proposal Form for which a blank space has been provided.

4.5.3 The Bidder further agrees that each of the Subcontractors listed on the Proposal Form will be used for the work indicated at the amount stated unless a substitution is permitted by the University.

4.5.4 The Bidder further agrees and warrants that he has made good faith efforts to employ minority business enterprises as Subcontractors and suppliers of materials under such contract and shall provide the Commission on Human Rights and Opportunities with such information as is requested by the Commission concerning his employment practices and procedures as they relate to the provisions of the general statutes governing contract requirements.

4.5.5 Pursuant to Connecticut General Statutes Section 49-41a, for every contract with the University for the construction, alteration or repair of any building or work, (1) the Contractor, within 30 days after payment to the Contractor by the University, shall be required to pay any amounts due any Subcontractor, whether for labor performed or materials furnished, when the labor or materials have been included in a requisition submitted by the Contractor and paid by the University; (2) the Contractor shall include in each of its subcontracts a provision requiring each Subcontractor to pay any amounts due any of its Subcontractors, whether for labor performed or materials furnished, within 30 days after each Subcontractor receives a payment from the Contractor which encompasses labor or materials furnished by such Subcontractor.

4.5.6 Within five days after being notified of the award of a general Contract by the University, or, in the case of an approval of a substitute Subcontractor by the University, within five days after being notified of such approval, the general Bidder shall present to each listed or substitute Subcontractor:

.1 A subcontract in the form set forth in Section 4b-96 of the Connecticut General Statutes and must be executed with all of your named subcontractors in your form of proposal.

.2 A notice of the time limit under this section for executing a subcontract. If a listed Subcontractor fails within five days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the general Bidder selected as a General Contractor, to perform his agreement to execute a subcontract in the form hereinafter set forth with such general Bidder, contingent upon the execution of the general Contract, the General Contractor shall select another Subcontractor, with the approval of the University. When seeking approval for a substitute Subcontractor, the general Bidder shall provide the University with all documents showing (a) the general Bidder's proper presentation of a subcontract to the listed Subcontractor and, (b) communications to or from such Subcontractor after such presentation. The University shall adjust the Contract Price to reflect the difference between the amount of the price of the new Subcontractor and the amount of the price of the listed Subcontractor, if the

new Subcontractor's price is lower and may adjust such Contract Price, if the new Subcontractor's price is higher. The general Bidder shall, with respect to each listed Subcontractor or approved substitute Subcontractor, file with the University a copy of each executed subcontract within ten days, Saturdays, Sundays and legal holidays excluded, of presentation of a subcontract to such Subcontractor.

.3 In the event of any conflict or inconsistency between the University of Connecticut's Subcontract form and the Contractor's standard Subcontract form, the provisions of the University of Connecticut's Subcontract form shall prevail. Any standard Subcontract form used will be attached as a supplement to the University of Connecticut's Subcontract form.

4.6 LIQUIDATED DAMAGES

4.6.1 Liquidated Damages of Five Hundred and 00/100 Dollars ($500.00) per calendar day shall be assessed if the Contractor fails to achieve Substantial Completion, or causes delay to the Substantial Completion of any portion of the Work within the Contract Time.

4.7 **COMMISSION ON HUMAN RIGHTS AND OPPORTUNITIES CONTRACT COMPLIANCE REGULATIONS:**

The contract to be awarded is subject to contract compliance requirements mandated by Sections 4a-60 and 4a-60a of the Connecticut General Statutes; and, when the awarding agency is the State, Sections 46a-71(d) and-81i(d) of the Connecticut General Statutes. There are Contract Compliance Regulations codified at Section-68j-21 through 43 of the Regulations of Connecticut State Agencies, which establish a procedure for awarding all contracts covered by Sections 4a-60 and 46a-71(d) of the Connecticut General Statutes. According to Section 46a-68j-30(9) of the Contract Compliance Regulations, every agency awarding a contract subject to the contract compliance requirements has an obligation to "aggressively solicit the participation of legitimate minority business enterprises as bidders, contractors, subcontractors and suppliers of materials." Minority business enterprise" is defined in Section 4a-60 of the Connecticut General Statutes as a business wherein fifty-one percent or more of the capital stock, or assets belong to a person or persons: "(1) Who are active in daily affairs of the enterprise; (2) who have the power to direct the management and policies of the enterprise; and (3) who are members of a minority, as such term is defined in subsection (a) of Section 32-9n." "Minority" groups are defined in Section 32-9n of the Connecticut General Statutes as "(1) Black Americans . . .(2) Hispanic Americans . . . (3) persons who have origins in the Iberian Peninsula . . . (4)Women . . . (5) Asian Pacific Americans and Pacific Islanders; (6) American Indians . . ." An individual with a disability is also a minority business enterprise as provided by Section 4a-60g of the Connecticut General Statutes. The above definitions apply to the contract compliance requirements by virtue of Section 46a-68j-21(11) of the Contract Compliance Regulations. The awarding agency will consider the following factors when reviewing the bidder's qualifications under the contract compliance requirements:(a) the bidder's success in implementing an affirmative action plan;(b) the bidder's success in developing an apprenticeship program complying with Sections 46a-68-1 to 46a-68-17 of the Administrative Regulations of Connecticut State Agencies, inclusive;(c) the bidder's promise to develop and implement a successful affirmative action plan;(d) the bidder's submission of employment statistics contained in the "Employment Information Form", indicating that the composition of its workforce is at or near parity when compared to the racial and sexual composition

of the workforce in the relevant labor market area; and(e) the bidder's promise to set aside a portion of the contract for legitimate minority business enterprises. See Section 46a-68j-30(10)(E) of the Contract Compliance Regulations.

4.7.1 The following BIDDER CONTRACT COMPLIANCE MONITORING REPORT must be completed in full, signed, and submitted with the bid for this contract. The contract awarding agency and the Commission on Human Rights and Opportunities will use the information contained thereon to determine the bidders compliance to Sections 4a-60 and 4a-60a CONN. GEN. STAT., and Sections 46a-68j-23 of the Regulations of Connecticut State Agencies regarding equal employment opportunity, and the bidder's good faith efforts to include minority business enterprises as subcontractors and suppliers for the work of the contract.

1) Definition of Small Contractor:
Section 4a-60g CONN. GEN. STAT. defines a small contractor as a company that has been doing business under the same management and control and has maintained its principal place of business in Connecticut for a one year period immediately prior to its application for certification under this section, had gross revenues not exceeding ten million dollars in the most recently completed fiscal year, and at least fifty-one percent of the ownership of which is held by a person or persons who are active in the daily affairs of the company, and have the power to direct the management and policies of the company, except that a nonprofit corporation shall be construed to be a small contractor if such nonprofit corporation meets the requirements of subparagraphs (A) and (B) of subdivision 4a-60g CONN. GEN. STAT.

2) Description of Job Categories (as used in Part IV Bidder Employment Information)
MANAGEMENT: Managers plan, organize, direct, and control the major functions of an organization through subordinates who are at the managerial or supervisory level. They make policy decisions and set objectives for the company or departments. They are not usually directly involved in production or providing services. Examples include top executives, public relations managers, managers of operations specialties (such as financial, human resources, or purchasing managers), and construction and engineering managers.
BUSINESS AND FINANCIAL OPERATIONS: These occupations include managers and professionals who work with the financial aspects of the business. These occupations include accountants and auditors, purchasing agents, management analysts, labor relations specialists, and budget, credit, and financial analysts.
COMPUTER SPECIALISTS: Professionals responsible for the computer operations within a company are grouped in this category. Examples of job titles in this category include computer programmers, software engineers, database administrators, computer scientists, systems analysts, and computer support specialists
ARCHITECTURE AND ENGINEERING: Occupations related to architecture, surveying, engineering, and drafting are included in this category. Some of the job titles in this category include electrical and electronic engineers, surveyors, architects, drafters, mechanical engineers, materials engineers, mapping technicians, and civil engineers.
OFFICE AND ADMINISTRATIVE SUPPORT: All clerical-type work is included in this category. These jobs involve the preparing, transcribing, and preserving of written communications and records; collecting accounts; gathering and distributing information; operating office machines and electronic data processing equipment; and distributing mail. Job titles listed in this category include telephone operators, payroll clerks, bill and account collectors, customer service representatives, files clerks, dispatchers, shipping clerks, secretaries and

administrative assistants, computer operators, mail clerks, and stock clerks.

BUILDING AND GROUNDS CLEANING AND MAINTENANCE:
This category includes occupations involving landscaping, housekeeping, and janitorial services. Job titles found in this category include supervisors of landscaping or housekeeping, janitors, maids, grounds maintenance workers, and pest control workers.

CONSTRUCTION AND EXTRACTION: This category includes construction trades and related occupations. Job titles found in this category include boilermakers, masons (all types), carpenters, construction laborers, electricians, plumbers (and related trades), roofers, sheet metal workers, elevator installers, hazardous materials removal workers, paperhangers, and painters. Paving, surfacing, and tamping equipment operators; drywall and ceiling tile installers; and carpet, floor and tile installers and finishers are also included in this category. First line supervisors, foremen, and helpers in these trades are also grouped in this category.

INSTALLATION, MAINTENANCE AND REPAIR: Occupations involving the installation, maintenance, and repair of equipment are included in this group. Examples of job titles found here are heating, ac, and refrigeration mechanics and installers; telecommunication line installers and repairers; heavy vehicle and mobile equipment service technicians and mechanics; small engine mechanics; security and fire alarm systems installers; electric/electronic repair, industrial, utility and transportation equipment; millwrights; riggers; and manufactured building and mobile home installers. First line supervisors, foremen, and helpers for these jobs are also included in the category.

MATERIAL MOVING WORKERS: The job titles included in this group are Crane and tower operators; dredge, excavating, and lading machine operators; hoist and winch operators; industrial truck and tractor operators; cleaners of vehicles and equipment; laborers and freight, stock, and material movers, hand; machine feeders and off bearers; packers and packagers, hand; pumping station operators; refuse and recyclable material collectors; and miscellaneous material moving workers.

3) Definition of Racial and Ethnic Terms (as used in Part IV Bidder Employment Information):
White (not of Hispanic Origin) - All persons having origins in any of the original peoples of Europe, North Africa, or the Middle East.
Black (not of Hispanic Origin) - All persons having origins in any of the Black racial groups of Africa.
Hispanic- All persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
Asian or Pacific Islander- All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands. This area includes China, India, Japan, Korea, the Philippine Islands, and Samoa.
American Indian or Alaskan Native- All persons having origins in any of the original peoples of North America, and who maintain cultural identification through tribal affiliation or community recognition

ARTICLE 5 CONSIDERATION OF BIDS

5.1 Every general bid which is conditional or obscure, or which contains any addition not called for shall be invalid; and the University shall reject every such general Bid. The University shall be authorized to waive minor irregularities, which it considers in its best interest, provided the reasons for any such waiver are stated in writing by the University and made a part of the contract file. No such general Bid shall be rejected because of the failure to submit prices for, or information relating to, any item or items for which no specific space is provided in the general Proposal Form furnished by the University,

but this sentence shall not be applicable to any failure to furnish prices or information required by Articles 4.2.1 and 4.4.1 above to be furnished in the form provided by the University. The University also reserves the right to reject any and all bids and again advertise for bids, or to otherwise proceed as permitted under Connecticut General Statutes 10a-109a through 10a-109y.

5.2 General Bids shall be publicly opened and read by the University forthwith. The University may require in the Proposal Form that the General Contractor agree to perform a stated, minimum percentage of work with his own forces. The University may also require the General Contractor to set aside a portion of the contract for Subcontractors who are eligible for set aside contracts. The University shall not permit substitution of a Subcontractor for one named in accordance with the provisions of these Instructions or substitution of a Subcontractor for any designated sub-trade work bid to be performed by the General Contractor's own forces, except for good cause. The term "good cause" includes but is not limited to a Subcontractor's or, where appropriate, a General Contractor's: (1) Death or physical disability, if the listed Subcontractor is an individual; (2) dissolution, if a corporation or partnership; (3) bankruptcy; (4) inability to furnish any performance and payment bond shown on the Proposal Form; (5) inability to obtain, or loss of, a license necessary for the performance of a particular category of work; (6) failure or inability to comply with a requirement of law applicable to Contractors, Subcontractors, on construction, alteration, or repair projects; (7) failure to perform his agreement to execute a subcontract under Connecticut General Statutes Section 4b-96.

5.3 The general Bid Price shall be the price set forth in the space provided on the general Proposal Form. No general Bid shall be rejected (1) because of error in setting forth the name of a Subcontractor as long as the Subcontractors designated are clearly identifiable, or (2) because the Drawings and specifications do not accompany the Bid or are not submitted with the Bid. **FAILURE TO CORRECTLY STATE A SUBCONTRACTOR'S PRICE MAY BE CAUSE FOR REJECTION OF THE GENERAL BIDDER'S BID.**

5.4 Any General Contractor who violates any provision of Connecticut General Statutes Section 4b-95 may be disqualified from bidding on other contracts that are subject to the provisions of Chapter 60 of the General Statutes for a period not to exceed twenty-four months, commencing from the date on which the violation is discovered, for each violation.

5.5 The University reserves the right to accept or reject any or all Bids within 90 calendar days of the Bid opening, and the Bidder agrees that it may not modify, withdraw, or cancel its Bid and that its Bid Price will be firm for this 90 day period. This 90 day period may be extended by mutual agreement between the University and the Bidder.

5.6 The project will be awarded to the responsible qualified Bidder submitting the lowest Bid in compliance with the Bid requirements and within the budget, subject to the provisions of Connecticut General Statutes 10a-109a through 10a-109y.

5.7 The University reserves the right to elect to implement some, all or none of the Alternates and/or Options set forth in the Proposal forms, as may be in the best interest of the University. The low Bid shall be determined by taking the Base Price set forth in the Proposal form as selected by the University, plus the Alternates and/or Options selected by the University.

5.8 The Bidder agrees that if selected as General Contractor, he shall, within ten (10) days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the University, execute a contract in accordance with the terms of the general Bid.

ARTICLE 6 POST- BID INFORMATION

6.1 Affirmative Action

6.1.1 Pursuant to Connecticut General Statutes Section 46a-68d, if this project is estimated to cost more than $50,000.00 then: In the event that the Bidder's Bid is accepted, after acceptance, but before a contract is awarded, the successful Bidder shall file and have approved by the Commission on Human Rights and Opportunities an Affirmative Action Plan. The Commission may provide for conditional acceptance of an Affirmative Action Plan provided written assurances are given by the Contractor that it will amend its plan to conform to affirmative action requirements. The University shall withhold 2% of the total Contract Price per month from any payment made to such Contractor until such time as the Contractor has developed an Affirmative Action Plan, and received the approval of the Commission. Notwithstanding the provisions of Connecticut General Statutes Section 46a-68d, a Contractor subject to the provisions of that Section may file a plan in advance of or at the same time as its Bid.

6.1.2 The University shall not enter into a contract with any Bidder or prospective Contractor unless the Bidder or prospective Contractor has satisfactorily complied with the provisions of Sections 4a-60, 32-9e, 46a-56 and 46a-68c to 46a-68f, inclusive of the Connecticut General Statutes, or submits a program for compliance acceptable to the Commission on Human Rights and Opportunities.

6.1.3 The Contractor shall designate an "Equal Opportunity Contract Compliance Officer" for the project. The Contractor designee, in addition to any other duties assigned by the Contractor, shall have the following responsibilities for the implementation of the Contractor Affirmative Action Plan (AAP) that is required for the project pursuant to Connecticut General Statutes Section's 46a-68c and 46a-68d.

.1 Maintain a project EEO file to include all records, correspondence and other documentation related to the project AAP.

.2 Communicate to and inform all project Contractors and Subcontractors, regardless of tier, and labor referral organizations (if applicable) about project equal opportunity and AAP expectations and performance requirements.

.3 Compile all on-site Contractor MONTHLY EMPLOYMENT UTILIZATION REPORTS (form CHRO cc-257) and submit a cumulative report for the project each month to report on contractor compliance to project AAP hiring goals. The cumulative report shall be submitted to the contract awarding agency and to the Commission on Human Rights and Opportunities by the 15th day following the end of each calendar month during the pendency of the on-site construction work of the project.

.4 Attach a copy of your transmittal letter to CHRO as a document to be submitted with your invoice.

.5 Compile and submit a QUARTERLY SMALL CONTRACTOR AND MINORITY BUSINESS ENTERPRISE PAYMENT STATUS REPORT (form CHRO cc-258) to report on the participation of such Contractors identified to participate on the project. The report

shall be submitted to the contract awarding agency and to the Commission on Human Rights and Opportunities by the 15th day following the end of each calendar quarter during the pendency of the on-site construction work of the project.

.6 Attach a copy of your transmittal letter to CHRO as a document to be submitted with your invoice.

.7 Participate in project job meetings to inform project Contractors about project equal opportunity and AAP performance.

.8 Coordinate "External Communication" section (employment outreach) of contractor AAP for all employment opportunities resultant during the course of the project from all project Contractors and maintain documentation of all contacts and responses.

6.2 Tax Identification

6.2.1 The Contractor shall furnish to the Owner, at the time of execution of the Contract, the following information

.1 The identity and addresses of all subcontractors performing work on the project.
.2 The Connecticut tax registration numbers of the Contractor and all subcontractors.
.3 The Federal Social Security account numbers, or Federal Employer Identification numbers, or both, if applicable, for the Contractor and all subcontractors.

6.2.2 The aforementioned information shall be continuously updated by the Contractor to reflect any additions or changes to the previously identified subcontractors. Any final additions or changes to this information shall be submitted to the Owner with the Contractor's application for final payment.

ARTICLE 7 PERFORMANCE AND PAYMENT BONDS AND CERTIFICATE OF COMPLIANCE.

7.1 Performance Bond

7.1.1 N/A for this solicitation

7.2 Labor and Material Payment Bond

7.2.1 N/A for this solicitation

7.3 Nonresident Contractor Certificate of Compliance

7.3.1 Prior to execution of the Contract, the Bidder shall submit proof that ensures they and all subcontractors being contracted to perform work under the awarded bid; are State of Connecticut resident contractors. Such proof shall be in a form on the awarding Contractor's letter head signed by the owner or principle of the company having authority to ensure that all agreements entered into under this contract are in-state resident contractors. Should the awarding Contractor and/or subcontractors who will perform work under this contract, are nonresident of the State of Connecticut, the awarding Contractor must provide a Certificate of Compliance from the Department of Revenue Services (DRS) for those nonresident firms who

will be under contract. This Certificate of Compliance is pursuant to Statue 12-430 as amended by 2005 Connecticut Public Acts 260, 6; Connecticut Agencies Regulations 12-430 (7)-1.

7.4 General Provisions Regarding Bonds

7.4.1 The aforementioned Performance and Payment bonds shall be provided in the forms required by the University, samples of which are appended hereto. If the Contractor is a Joint Venture, all such bonds shall name all joint ventures as principals. The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney. The above bonds shall be required for awards for which the total estimated cost of labor and materials under the Contract is at least $100,000.00. The above bonds shall be acceptable to the University and, as a minimum, issued through a bonding company licensed to transact such business in the State of Connecticut and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the "Treasury Department Circular 570."

ARTICLE 8 AFFIDAVITS/ETHICS AFFIRMATIONS

8.1 Affidavits/Ethics Affirmations to be completed in accordance with the instructions provided on the OPM website for each Affidavits/Ethics Affirmations.

Form 1. Gift and Campaign Contribution Certification (for contract values >$50,000)

Form 5. Consulting Agreement Affidavit (for contract values >$50,000)

Form 6. Affirmation of Receipt of State Ethics Laws Summary (for contract values >$500,000)

Form 7. Iran Certification (for contract values >$500,000)

Nondiscrimination Certification:

Form B. Nondiscrimination Certification (for contract values <$50,000)

Form C. Nondiscrimination Certification (for contract values >$50,000)

8.2 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 of series of such agreements or contracts having a value of $100,000 or more, the authorized signatory to this submission in response to the State's solicitation expressly state contractors of state campaign contribution and solicitation prohibitions, and will inform its principals of the contents of the notice. See attached **SEEC Form 11.**

Obtain OPM has posted the approved Forms on the OPM Web site - http://www.opm.state.ct.us/secr/forms/ContractAffidavitRequirements.htm

ARTICLE 9 CONTRACT

9.1 A draft of the contract has been provided with the bid documents. The University reserves the right to modify the contract or wave any informality as it deems to be in the best interest of the University. By submitting a bid the Contractor accepts the contract and any modifications that the University deems necessary to it without exception. Exceptions to the contract submitted by the Contractor at any time will not be considered.

UNIVERSITY OF CONNECTICUT
FINE ARTS AIR CONDITIONING
PROJECT #FO500088

REQUEST FOR INFORMATION FORM

PLEASE TYPE -OR- PRINT / SEE INVITATION AND ADDENDA'S FOR RFI DEADLINE

TO: **The University of Connecticut**
Fax (860) 486-1953

FROM: _____
(Name of Bidding Firm)

ATTN: Walt Dalia
walter.dalia@uconn.edu

Contact Name: _____

RFI Deadline: See Invitation/Bid Clarifications Phone #:_____ **Fax #**:_____

Specification Section: _____ **Drawing No. / Drawing Date**: _____

QUESTION (Please be specific): _____

_____

_____

_____

_____

RESPONSE: _____

_____

_____

_____

_____

_____

Signature: _____ **Date:** _____

NOTE: All questions must be submitted in writing before the prescribed RFI Deadline. No verbal questions will be answered. All questions must be submitted in writing on this RFI Form. All answers to RFI's will be issued in a Bidder's Clarification.

STATE OF CONNECTICUT
STATE ELECTIONS ENFORCEMENT COMMISSION
20 Trinity Street Hartford, Connecticut 06106—1628

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 section 4a-100. "Prospective state contractor" does not include a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Principal of a state contractor or prospective state contractor" means (i) any individual who is a member of the board of directors of, or has an ownership interest of five per cent or more in, a state contractor or prospective state contractor, which is a business entity, except for an individual who is a member of the board of directors of a nonprofit organization**,** (ii) an individual who is employed by a state contractor or prospective state contractor, which is a business entity, as president, treasurer or executive vice president, (iii) an individual who is the chief executive officer of a state contractor or prospective state contractor, which is not a business entity, or if a state contractor or prospective state contractor has no such officer, then the officer who duly possesses comparable powers and duties, (iv) an officer or an employee of any state contractor or prospective state contractor who has *managerial or discretionary responsibilities with respect to a state contract,* (v) the spouse or a *dependent child* who is eighteen years of age or older of an individual described in this subparagraph, or (vi) a political committee established or controlled by an individual described in this subparagraph or the business entity or nonprofit organization that is the state contractor or prospective state contractor.

"State contract" means an agreement or contract with the state or any state agency or any quasi-public agency, let through a procurement process or otherwise, having a value of fifty thousand dollars or more, or a combination or series of such agreements or contracts having a value of one hundred thousand dollars or more in a calendar year, for (i) the rendition of services, (ii) the furnishing of any goods, material, supplies, equipment or any items of any kind, (iii) the construction, alteration or repair of any public building or public work, (iv) the acquisition, sale or lease of any land or building, (v) a licensing arrangement, or (vi) a grant, loan or loan guarantee. "State contract" does not include any agreement or contract with the state, any state agency or any quasi-public agency that is exclusively federally funded, an education loan 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.

END OF INSTRUCTION TO BIDDERS

UCONN

PROCUREMENT SERVICES

CAPITAL PROJECTS AND
FACILITIES PROCUREMENT

BID SUBMISSION

FOR

FINE ARTS AIR CONDITIONING

PROJECT NUMBER: FO500088

UNIVERSITY OF CONNECTICUT
STORRS CAMPUS
Storrs, Connecticut

March 24, 2020

NAME OF FIRM SUBMITTING:

_____

UNIVERSITY OF CONNECTICUT
FINE ARTS AIR CONDITIONING
PROJECT #FO500088

FORM OF PROPOSAL

Proposal Submission Checklist

The following documents and information shall be submitted and included as your bid proposal. All documents must be submitted in a sealed envelope reflecting the submitting firm's name and address; addressed to CPCA attention to the appropriate purchasing agent, clearly stating the project name and project number. All required documents are to be included and executed in their original condition as issued.

- ☐ Ethics Forms 1 and 5 (if contract value is > $50,000) and Nondiscrimination Certification Form C.
- ☐ Bid Bond
- ☐ Fully executed Form of Proposal
- ☐ Copies of prequalification certificate and an updated statement as prescribed by Commissioner of Administrative Services for the State of Connecticut.
- ☐ How did you learn about this Project?
  - Hartford Courant
  - Waterbury Republican
  - Norwich Bulletin
  - DAS
  - CPCA Website
  - Other_____

Contractors Certification

By submitting a bid proposal, the bidder is attesting to the review, reading, understanding, and acceptance of the information and requirements of the project contained within the bid documents without exception. By submitting a bid proposal, the Bidder represents that they have examined the site, and accept the conditions under which the work will be performed and we have read, evaluated, understand, and accepted all the Contract Documents, including those documents provided for on the Disk, and their content in their entirety and have included all provisions necessary to accomplish all work according to the information and requirements prescribed therein without exception.

SUBMITTED BY:
Firm: _____ Date: _____

Address: _____

SUBMITTED BY: _____

Print Name: _____

Title: _____

Telephone: _____

Contractor's Initials:_____

FORM OF PROPOSAL

University of Connecticut
Walt Dalia, Procurement Services
Capital Project & Contract Administration
3 Discovery Drive, Unit 6076
Storrs, Connecticut 06269-6047

Dear Mr. Dalia:

1. In accordance with Connecticut General Statutes Sections 10a-109a through 10a-109y and pursuant to, and in compliance with your Invitation to Bid, the Notice and Instructions to Bidders, the Form of Contract, including the conditions thereto, the form of required bond, I (we) propose to furnish the labor and/or materials installed as required for the project named and numbered on the FORM OF PROPOSAL of this proposal to the extent of the Proposal submitted herein, furnishing all necessary equipment, machinery, tools, labor and other means of construction, and all materials specified in the manner and at the time prescribed strictly in accordance with the provisions of the Contract including specifications and/or drawings together with all addenda issued and received prior to the scheduled closing time for the receipt of the bids, and in conformity with requirements of the University of Connecticut and any laws or departmental regulations of the State of Connecticut or of the United States which may affect the same, for and in consideration of the price(s) stated on the said FORM OF PROPOSAL, hereof.

2. The Lump Sum Base Bid by me (us) on the FORM OF PROPOSAL includes all work indicated on the drawings and/or described in the specifications (including the furnishing and installing of all required materials, labor, equipment and allowances where applicable), except:

   A. Work covered by Alternates as may be listed on the FORM OF PROPOSAL.

   B. Contingent work covered by Unit Prices as may be listed on the FORM OF PROPOSAL.

   C. Work covered by Options as may be listed on the FORM OF PROPOSAL.

3. This proposal is submitted subject to and in compliance with the foregoing and following conditions and/or information.

   A. AWARD: All proposals shall be subject to the provisions and requirements of the Bid Documents and for purpose of award, consideration shall be given only to proposals submitted by qualified and responsible bidders.

   B. COMMENCEMENT AND COMPLETION OF WORK: Contractor shall commence and complete the work in accordance with the requirements of the Contract Documents.

   C. If the Contractor fails to complete the work within the time required by the Contract Documents, the University shall have the right to assess liquidated damages as provided in the Instructions to Bidders Section 4.6.

   D. CONTRACTORS INSURANCE REQUIRED:
      1. The limits of liability and coverages shall be those set forth in Article 11 of the General Conditions included with this bid package (or as previously executed with the on-call trade contract).

   E. REQUIRED PERCENTAGES OF WORK AND SET-ASIDES

 Contractor's Initials:_____

.1 We (I) as the general Contractor/Trade Contractor will self-perform at least 30% of the Scope of Work, and 50% of the entire Scope of Work (of the project or repair) will be completed by S/MBE contractors as determined by the UConn $0 to less than $100,000 On-Call Program which further encourages S/MBE participation/inclusion. If a subcontractor for part of the work is not an S/MBE, we (I) will submit a written explanation as to why the Contractor is unable to self-perform that part of the work. The work self-performed by my firm will be included in the 50% Scope of Work.

F. NONDISCRIMINATION & LABOR RECRUITMENT:

We (I) agree that the Contract awarded for this project shall be subject to the Executive Orders No. Three and Seventeen, promulgated June 16, 1971 and February 15, 1973 respectively and to the Guidelines and Rules of the State Labor Department implementing Executive Order No. Three and further agree to submit reports of Compliance Staffing on Labor Department Form E.O.3-1, when and as requested.

G. FEDERAL & STATE WAGE DETERMINATIONS AND PRICING CONSIDERATION:

.1 Each contractor who is awarded a contract on or after October 1, 2002 shall be subject to provisions of the Connecticut General Statutes, Section 31-53 as amended by Public Act 02-69, "An Act Concerning Annual Adjustments to Prevailing Wages".

.2 In determining bid price, consideration should be given to Section 31-53 of the General Statutes of Connecticut as amended by Public Act 02-69, "An Act Concerning Annual Adjustments to Prevailing Wages". Such prevailing wage adjustment will not be considered a basis for an annual contract adjustment.

.3 The State of Connecticut Labor Department Wage Schedule where required, shall be provided with these documents, typically with the Bidders' Convenience Package, or will be incorporated in the Contract Documents as an Addendum. At the time of bidding, the bidder agrees to accept the current prevailing wage scale, as well as any annual adjustment to the prevailing wage scale, as provided by the Connecticut Department of Labor. Wage Rages will be posted each July 1st on the Department of Labor website: www.ctdol.state.ct.us . Such prevailing wage adjustment will not be considered a basis for an annual contract amendment.

H. CERTIFICATION OF BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY & NON-SEGREGATED FACILITIES:

We (I) acknowledge that we (I) and our subcontractors are obligated to fill out the forms provided by the University of Connecticut Office of Capital Project and Contract Administration and to agree to certify to the compliance of non-segregated facilities.

I. NOTICE TO EXECUTIVE BRANCH STATE CONTRACTORS AND PROSPECTIVE STATE CONTRACTORS OR CAMPAIGN CONTRIBUTION AND SOLICITATION BAN.

With regard to a State contract as defined in P.A. 07-1 having a value in a contract 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 submission in response to the State's solicitation expressly acknowledges receipt of the State Elections Enforcement Commission's notice advertising prospective principals of the contents of the notice. See Attachment SEEC Form 11.

4. ACCOMPANYING THIS PROPOSAL IS:

   A. A CERTIFIED CHECK drawn to the order of the University of Connecticut in the amount of 10% of the Bid, i.e.:

   _____ DOLLARS $_____

   and drawn on the _____
   (STATE BANK & TRUST COMPANY)

   _____ located at _____
   (A NATIONAL BANKING ASSOCIATION) (CITY & STATE)

   which is understood shall be cashed and the proceeds thereof used so far as may be necessary to reimburse the State of Connecticut for losses and damages arising by virtue of my (our) failure to file the required Bonds and execute the required contract in this proposal as accepted by the University of Connecticut.

   OR;

   B. A BID BOND having as surety thereto a Surety Company for Companies authorized to transact business in the State of Connecticut and made out in the penal sum of 10% of the bid, (Bids $50,000 and greater) i.e.:

   _____ DOLLARS $_____

   If the bidder is a joint venture, the Bid Bond shall specifically identify and include each joint venturer as a principal.

   C. If the bidder is a joint venture, a copy of the executed Joint Venture Agreement shall be submitted along with the bid materials.

5. We (I), the undersigned, hereby declare that I am (we are) the only person(s) interested in the proposal and that it is without any connection with any other person making any bid for the same work. No person acting for, or employed by, the State of Connecticut is directly interested in this proposal, or in any contract which may be made under it, or in expected profits to arise therefrom. This proposal is made without directly or indirectly influencing or attempting to influence any other person or corporation to bid or refrain from bidding or to influence the amount of the bid of any other person or corporation. This proposal is made in good faith without collusion or connection with any other person bidding for the same work and this proposal is made with distinct reference and relation to the plans and specifications prepared for this Contract. I (We) further declare that in regard to the conditions affecting the work to be done and the labor and materials needed, this proposal is based solely on my (our) investigation and research and not in reliance upon any representations of any employee, officer or agent of the State.

6. Each class of work set forth in a separate Section of the Specifications and designated as a subtrade in Item 2A of the proposal pages shall be the matter of a subcontract made in accordance with the procedures set forth in the Bid and Contract Documents.

7. The undersigned agrees that, if selected as General Contractor, he shall, within ten (10) days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the University of Connecticut, execute a contract in accordance with the terms of this general bid.

8. The undersigned agrees and warrants that he has made good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials under such contract and shall provide the Commission on Human Rights and Opportunities with such information as is requested by the Commission concerning his employment practices and procedures as they relate to the provisions of the Connecticut General Statutes governing contract requirements.

9. The undersigned acknowledges that should their submitted Form of Proposal fail to have included a copy of your firms prequalification certificate and an updated statement accompany their bid submission, that their bid will be invalid and considered non-responsive. Per CGS 4b-91 amended.

Contractor's Initials:_____

FORM OF PROPOSAL

A. STANDARD BID BOND:

NOW ALL MEN BY THESE PRESENTS,

That we, _____ hereinafter called the principal, of _____, as principal, and _____, hereinafter called the Surety, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact a surety business in the State of Connecticut, as Surety, are held and firmly bound unto the State of Connecticut, as obligee, in the penal sum of ten (10) percent of the amount of the bid set forth in a proposal hereinafter mentioned, _____, in lawful money of the United States of America, for the payment of which sum, well and truly to be made to the Obligee, the Principal and the Surety bind, themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH,

That, whereas the Principal has submitted or is about to submit a proposal the other obligee related to a contract for the Project Referenced above.

NOW, THEREFORE, if the said contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter in the said contract in writing with the State of Connecticut and give the required bonds, with surety acceptable to the Oligee, or if the Principal shall fail to do so, pay to Obligee the damages which the Obligee may suffer by reason of such failure not exceeding the penal sum of this bond, then this obligation shall be void, otherwise to remain in full force and effect.

SIGNED, SEALED AND DATED this _____ day of _____, 20___

_____	_____	_____	_____
Witness	Surety	Witness	Principal
	_____		_____
	Title		Title

B. The undersigned proposes to furnish all labor and material required for:

FINE ARTS AIR CONDITIONING
Project #FO500088
University of Connecticut
Storrs, CT

In accordance with the accompanying Drawings and Specifications prepared by:

Van Zelm Engineers

The Contract Price specified below subject to additions and deductions according to the terms of the Contract Documents.

C. BID CLARIFICATIONS:

The undersigned acknowledges receipt of the following Bid Clarifications issued during the bidding period and has included all changes therein in the above base bid amount.

Clarifications/Addenda #_____, Dated_____
Clarifications/Addenda #_____, Dated_____
Clarifications/Addenda #_____, Dated_____
Clarifications/Addenda #_____, Dated_____

D. PROPOSED BASE CONTRACT PRICE:

Having carefully examined the Bid Documents for the above reference project, and having visited the project site and examined all conditions affecting the work, the undersigned, upon written notice of award of contract, agrees to provide all labor, supervision, materials, tools, construction equipment, services, safety, insurance, bonds, and to pay all applicable taxes, and other costs necessary or required to complete the Work of this Bid in full accordance with all Bid Documents and within the required timeframe as indicated by the proposed schedule for the Lump Sum Bid of:

_____US Dollars

($_____) (which incorporates all allowances as may be listed in the plans and specifications)

(Show the amount in both words and figures. In case of discrepancy, amount shown in words will govern.)

The University reserves the right to elect to implement some, all or none of the Alternates and/or Options set forth in the Proposal forms, as may be in the best interest of the University. The low Bid shall be determined by taking the Base Price set forth in the Proposal form as selected by the University, plus the Alternates and/or Options selected by the University.

E. SCHEDULE OF ALTERNATES: Revised 2/28/17

Provide Alternate Prices which reflect the work of the bid package under which this bid proposal was submitted and shall remain ***valid for the life of the project*** and include **all costs** for a complete installation. All pricing is inclusive of all costs of wages, applicable taxes, benefits, and applicable insurance. The Prices herein shall remain valid for the life of the project and include all costs for a complete installation. Alternate prices are good for both adds and deducts.

A. Alternate No. 1: Replace Condenser Water Pumps P-1, P-2 and P-3

1. Provide and install new condenser water pumps and associated suction straighteners, as indicated on Sheets M1.2 and M4.1, and in Specification 232123, Hydronic Pumps. Include all associated demolition, installation, electrical work, system modifications startup and balancing, finish work.

Add/Delete (Circle One) $_____

B. Alternate No. 2: Replace Sand Filter SF-1

1. Provide and install new sand filter unit. Provide costs for additional material and labor required (Div 23 and Div 26) with providing new filter system. General cost for removal and re-installment of existing SF-1 is part of base bid. Bid alternate 2 to include only material cost and labor beyond base bid. Reference Sheet M1.2 and Specification 232500, HVAC Water Treatment.

Add/Delete (Circle One) $_____

C. Alternate No. 3: Replace Chemical Water Treatment System with Non Chemical Type

1. Provide and install new non-chemical water treatment system. Include all associated demolition, installation, system modifications (Div 23 and 26), start up and balancing, finish work. Reference Sheet M1.2 and Specification 232500, HVAC Water Treatment.

Add/Delete (Circle One) $_____

D. Alternate No. 4: Stainless Steel Option for CT-1 and CT-2

Provide all stainless steel construction for cooling towers, per manufacturer's standard option. Reference Sheet M1.2 and Specification 236500, Cooling Towers

Add/Delete (Circle One) $_____

END OF ALTERNATES

F. SCHEDULE OF UNIT PRICES: (Not Used)

All rates are inclusive of all costs of wages, applicable taxes, benefits, applicable insurance. The rates provided will be negotiated and included as part of the contract and of your subcontracts. The Unit Prices herein shall remain valid for the life of the project and include all costs for a complete installation. Unit prices are good for both adds and deducts.

End of Unit Prices

G. SCHEDULE OF VALUES:

The undersigned agrees that the Schedule of Values submitted with this Bid is a true representation of the distribution of the costs of this project and equals the Stipulated Sum shown above. The Schedule of Values is an integral part of this proposal. Please indicate N/A for those divisions of work not applicable. The costs provided below include the complete cost for furnishing and installing of materials, labor, and equipment required to provide the complete scope of work for each specified division (includes the costs of applicable taxes, insurance, bonds, overhead, profit, small tools, travel, parking, supervision, etc.). The "TOTAL" price must equal your total lump sum bid proposal.

Division	Group	
01	General Conditions	$
02	Existing Conditions	$
05	Metals	$
07	Thermal & Moisture Protection	$
09	Finishes	$
22	Plumbing	$
*23	HVAC Heating, Ventilating, Air Conditioning	$
26	Electrical	$
Insurance		$
Bonds		$
TOTAL		$

Contractor's Initials:_____

H. The subdivision of Work in the proposed Contract Price is as follows:

ITEM 1 WORK BY GENERAL CONTRACTOR:
For all work other than that to be done by subcontractors included in Item 2A and Item 2B.

$_____(ITEM 1)

Note: In accordance with paragraph 3.E.1 this amount, together with work by the general contractor as listed in Item 2A below, must be at least 10% of the total bid price.

ITEM 2A WORK BY SUBCONTRACTORS NAMED:

Subcontractors and prices for the following trades must be listed (if such prices exceed $25,000). However, the general bidder may list himself together with his price if he customarily performs any of the trades specified. If the general contractor requires a performance and/or labor & material payment bond then the general contractor must indicate below which of the subcontractors are subject to this requirement. The amount (%) shall not exceed the subcontractor's price listed below.

DESCRIPTION	NAME OF SUBCONTACTOR	DOLLAR AMOUNT	LABOR & MATERIAL BOND	PERFORMANCE BOND
MASONRY				
ELECTRICAL				
MECHANICAL WITHOUT HVAC				
HVAC				

A copy of the executed agreement between the successful bidder and the named subcontractors above must be presented to the Office of CPFP at time of contract signing. The contract may not be executed until copies of executed agreements are received by CPFP.

ITEM 2B WORK BY SUBCONTRACTORS NOT NAMED:

$_____
(INCLUDES ALL SUBCONTRACT WORK NOT LISTED IN ITEM 2A)

The undersigned agrees that each of the subcontractors listed on this FORM OF PROPOSAL will be used for the work indicated at the amount stated, unless a substitution is permitted by the University.

I. SET-ASIDE CONTRACTOR SCHEDULE

By submitting a bid for this project, the bidder represents that it has used good faith efforts to secure commitments from SBEs and MBEs in a value that is equal to, or greater than, the Set Aside (as defined in the Invitation to Bid). If, despite its good faith efforts, a bidder has not yet been able to secure commitments for the full value of the Set Aside, the bidder will nonetheless be expected to meet the Set Aside if it is awarded the contract for this project.

Below, the bidder shall list those SBEs and MBEs from whom the bidder has secured commitments for the project as of the date hereof and the dollar amounts the bidder anticipates awarding to each such SBE/MBE.

Name	Address	Amount

CERTIFICATE OF ELIGIBILITY HAS BEEN OBTAINED THROUGH THE FOLLOWING WEBSITE; https://www.biznet.ct.gov/SupplierDiversity/SDSearch.aspx
FOR EACH OF THE NAMED CONTRACTORS AND IS BEING SUBMITTED WITH THIS FORM.

The Undersigned agrees that each of the subcontractors listed on the proposal form will be used for the work indicated at the amount stated, unless a substitution is permitted by the awarding authority.

_____ _____
Authorized Signature Title

_____
Company Name

J. BIDDER CONTRACT COMPLIANCE MONITORING REPORT

PART I - Bidder Information

<table>
<tr><td>Company Name
Street Address
City & State
Chief Executive</td><td>Bidder Federal Employer
Identification Number_____
Or
Social Security Number_____</td></tr>
<tr><td>Major Business Activity
(brief description)</td><td rowspan="3">Bidder Identification
(response optional/definitions in Instruction to Bidders page 18)

-Bidder is a small contractor. Yes__ No__

-Bidder is a minority business enterprise Yes__ No__
(If yes, check ownership category)

Black___ Hispanic___ Asian American___ American Indian/Alaskan Native ____
Iberian Peninsula___
Individual(s) with a Physical Disability___
Female___
-Bidder is certified as above by State of CT
Yes__ No__ -
DAS Certification Number
_____</td></tr>
<tr><td>Bidder Parent Company(If any)</td></tr>
<tr><td>Other Locations in Ct. (If any)</td></tr>
</table>

PART II - Bidder Nondiscrimination Policies and Procedures

1. Does your company have a written Affirmative Action/Equal Employment Opportunity statement posted on company bulletin boards? Yes__ No__	7. Do all of your company contracts and purchase orders contain non-discrimination statements as required by Sections 4a-60 & 4a-60a Conn. Gen. Stat.? Yes__ No__
2. Does your company have the state-mandated sexual harassment prevention in the workplace policy posted on company bulletin boards? Yes__ No__	8. Do you, upon request, provide reasonable accommodation to employees, or applicants for employment, who have physical or mental disability? Yes__ No__
3. Do you notify all recruitment sources in writing of your company's Affirmative Action/Equal Employment Opportunity employment policy? Yes__ No__	9. Does your company have a mandatory retirement age for all employees? Yes__ No__
4. Do your company advertisements contain a written statement that you are an Affirmative Action/Equal Opportunity Employer? Yes__ No__	10. If your company has 50 or more employees, have you provided at least two (2) hours of sexual harassment training to all of your supervisors? Yes__ No__ NA__
5. Do you notify the Ct. State Employment Service of all employment openings with your company? Yes__ No__	11. If your company has apprenticeship programs, do they meet the Affirmative Action/Equal Employment Opportunity requirements of the apprenticeship standards of the Ct. Dept. of Labor? Yes__ No__ NA__
6. Does your company have a collective bargaining agreement with workers? Yes__ No__ 6a. If yes, do the collective bargaining agreements contain non-discrimination clauses covering all workers? Yes__ No__ 6b. Have you notified each union in writing of your commitments under the nondiscrimination requirements of contracts with the state of Ct? Yes__ No__	12. Does your company have a written affirmative action Plan? If no, please explain. Yes__ No__ 13. Is there a person in your company who is responsible for equal employment opportunity? Yes__ No__ If yes, give name and phone number. _____ _____ _____

Part III - Bidder Subcontracting Practices

1. Will the work of this contract include subcontractors or suppliers? Yes__ No__

1a. If yes, please list all subcontractors and suppliers and report if they are a small contractor and/or a minority business enterprise as defined on page 1 / use additional sheet if necessary)

1b. Will the work of this contract require additional subcontractors or suppliers other than those identified in 1a? Yes__ No__

Part IV – Bidder Employment Information Date:

JOB CATEGORY	OVERALL TOTALS	WHITE (not of Hispanic origin)		BLACK (not of Hispanic origin)		HISPANIC		ASIAN or PACIFIC ISLANDER		AMERICAN INDIAN or ALASKAN NATIVE	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Management											
Business & Financial Ops											
Computer Specialists											
Architecture/Engineering											
Office & Admin Support											
Bldg/ Grounds Cleaning/Maintenance											
Construction & Extraction											
Installation , Maintenance & Repair											
Material Moving Workers											
TOTALS ABOVE											
Total One Year Ago											
FORMAL ON THE JOB TRAINEES (ENTER FIGURES FOR THE SAME CATEGORIES AS ARE SHOWN ABOVE)											
Apprentices											
Trainees											

PART V - Bidder Hiring and Recruitment Practices

1. Which of the following recruitment sources are used by you? (check yes or not and report percent used)				2. Check (x) any of the below listed requirements that you use as a hiring qualification (x)		3. Describe below any other practices or actions that you take which show that you hire, train, and promote employees without discrimination?
SOURCE	YES	NO	% of applicants provided by source			
State Employment Service					Work Experience	
Private Employment Agencies					Ability To Speak Or Write English	
Schools And Colleges					Written Tests	
Newpaper Advertisements					High School Diploma	
Walk Ins					College Degree	
Present Employees					Union Membership	
Labor Organizations					Personal Recommendations	
Minority/Community Organizations					Height Or Weight	
Others Please Identify					Car Ownership	
					Arrest Record	
					Wage Garnishments	

Certification (Read this form and check your statements on it CAREFULLY before signing).
I certify that the statements made by me on this BIDDER CONTRACT COMPLIANCE MONITORING REPORT are complete and true to the best of my knowledge and belief, and are made in good faith. I understand that if I knowingly make any misstatements of facts, I am subject to be declared in non-compliance with Section 4a-60, 4a-60a, and related sections of the CONN. GEN. SAT.

Signature) (Date Signed)

_____ _____

(Title) (Telephone)

FORM OF PROPOSAL

L. PROPOSER'S QUALIFICATION/RESPONSIBILITY STATEMENT

The Proposer shall have already completed and submitted the Questionnaire and other submission required by the University in its Invitation to Pre-Qualify, regarding the Proposer's qualifications. If changed circumstances arising since the initial submission, or other facts have occurred which would result in a material change to any of the Proposer's initial responses or submissions, the Proposer shall provide any such supplementary, or revised information at this time, along with its Proposal.

1. State, identify any such changed circumstances or other facts and provide any such supplementary or revised information as described above, identifying specifically, by number and content, each prior question, response to the Questionnaire, or information changed, supplemented or revised. (Attach a separate sheet if necessary)

2. State "NONE" if there are no changes to be made. _____

Please note that if the end date of the time period covered by the information submitted during your pre-qualification is three or more months old, please provide current financial documentation demonstrating that your present financial position has remained the same, or showing and identifying any changes in any way, in relation to the audited financial statement you submitted with your pre-qualified application on this proposal.

Dated at this day of 20
Name of Organization:
Signature:
Print Name:
Title:
Notary Statement:
Mr./Mrs./Ms. being duly sworn deposes and says that he/she
is the of and that the
(Position or Title) (Firm Name)
answers to the foregoing questions and all statements therein contained are true and correct.
Subscribed and sworn to before me this day of 20
Notary Public:
My Commission Expires: 20

M. ETHICS FORMS - A duly authorized representative of the company must sign these forms

- √ **These forms must be notarized and clearly show notary seal or acknowledged by a Commissioner of the Superior Court**.

- √ ALL REQUIRED forms, **must be completed, signed and returned** by the bidder/proposer as part of the bid/proposal/RFQ response package.

- √ Failure to submit ALL REQUIRED forms constitutes grounds for rejection of your bid/proposal/RFQ.

- √ If it is determined by the University of Connecticut and/or State of Connecticut that **any information requested was not referenced and submitted** with this bid/proposal/RFQ/LOI, and then such determination **will be just cause for disqualification of the bid/proposal/RFQ.**

Form C
07-08-2009

STATE OF CONNECTICUT

NONDISCRIMINATION CERTIFICATION — Affidavit By Entity For Contracts Valued at $50,000 or More

Documentation in the form of an affidavit signed under penalty of false statement by a chief executive officer, president, chairperson, member, or other corporate officer duly authorized to adopt corporate, company, or partnership policy that certifies the contractor complies with the nondiscrimination agreements and warranties under Connecticut General Statutes §§ 4a-60(a)(1) and 4a-60a(a)(1), as amended

INSTRUCTIONS:

For use by an entity (corporation, limited liability company, or partnership) when entering into any contract type with the State of Connecticut valued at $50,000 or more for any year of the contract. Complete all sections of the form. Sign form in the presence of a Commissioner of Superior Court or Notary Public. Submit to the awarding State agency prior to contract execution.

AFFIDAVIT:

I, the undersigned, am over the age of eighteen (18) and understand and appreciate the obligations of

an oath. I am _____ of _____ , an entity
Signatory's Title Name of Entity

duly formed and existing under the laws of _____.
Name of State or Commonwealth

I certify that I am authorized to execute and deliver this affidavit on behalf of

_____ and that _____
Name of Entity Name of Entity

has a policy in place that complies with the nondiscrimination agreements and warranties of Connecticut

General Statutes §§ 4a-60(a)(1)and 4a-60a(a)(1), as amended.

_____
Authorized Signatory

_____
Printed Name

Sworn and subscribed to before me on this _____ day of _____, 20___.

_____ _____
Commissioner of the Superior Court/ Notary Public **Commission Expiration Date**

OPM Ethics Form 1 Rev. 5-26-15

STATE OF CONNECTICUT

GIFT AND CAMPAIGN CONTRIBUTION CERTIFICATION

Written or electronic certification to accompany a State contract with a value of $50,000 or more, pursuant to C.G.S. §§ 4-250, 4-252(c) and 9-612(f)(2) and Governor Dannel P. Malloy's Executive Order 49.

INSTRUCTIONS:
Complete all sections of the form. Attach additional pages, if necessary, to provide full disclosure about any lawful campaign contributions made to campaigns of candidates for statewide public office or the General Assembly, as described herein. Sign and date the form, under oath, in the presence of a Commissioner of the Superior Court or Notary Public. Submit the completed form to the awarding State agency at the time of initial contract execution and if there is a change in the information contained in the most recently filed certification, such person shall submit an updated certification either (i) not later than thirty (30) days after the effective date of such change or (ii) upon the submittal of any new bid or proposal for a contract, whichever is earlier. Such person shall also submit an accurate, updated certification not later than fourteen days after the twelve-month anniversary of the most recently filed certification or updated certification.

CHECK ONE: ☐ Initial Certification ☐ 12 Month Anniversary Update (Multi-year contracts only.)

☐ Updated Certification because of change of information contained in the most recently filed certification or twelve-month anniversary update.

GIFT CERTIFICATION:

As used in this certification, the following terms have the meaning set forth below:

1) "Contract" means that contract between the State of Connecticut (and/or one or more of it agencies or instrumentalities and the Contractor, attached hereto, or as otherwise described by the awarding State agency below;

2) If this is an Initial Certification, "Execution Date" means the date the Contract is fully executed by, and becomes effective between, the parties; if this is a twelve-month anniversary update, "Execution Date" means the date this certification is signed by the Contractor;

3) "Contractor" means the person, firm or corporation named as the contactor below;

4) "Applicable Public Official or State Employee" means any public official or state employee described in C.G.S. §4 252(c)(1)(i) or (ii);

5) **"Gift"** has the same meaning given that term in C.G.S. § 4-250(1);

6) "Principals or Key Personnel" means and refers to those principals and key personnel of the Contractor, and its or their agents, as described in C.G.S. §§ 4-250(5) and 4-252(c)(1)(B) and (C).

I, the undersigned, am a Principal or Key Personnel of the person, firm or corporation authorized to execute this certification on behalf of the Contractor. I hereby certify that, no gifts were made by (A) such person, firm, corporation, (B) any principals and key personnel of the person firm or corporation who participate substantially in preparing bids, proposals or negotiating state contracts or (C) any agent of such, firm, corporation, or principals or key personnel who participates substantially in preparing bids, proposals or negotiating state contracts, to (i) any public official or state employee of the state agency or quasi-public agency soliciting bids or proposals for state contracts who participates substantially in the preparation of bid solicitations or request for proposals for state contracts or the negotiation or award of state contracts 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.

I further certify that no Principals or Key Personnel know of any action by the Contractor to circumvent (or which would result in the circumvention of) the above certification regarding **Gifts** by providing for any other Principals, Key Personnel, officials, or employees of the Contractor, or its or their agents, to make a **Gift** to any Applicable Public Official or State Employee. I further certify that the Contractor made the bid or proposal for the Contract without fraud or collusion with

any person.

CAMPAIGN CONTRIBUTION CERTIFICATION:

I further certify that, on or after January 1, 2011, neither the Contractor nor any of its principals, as defined in C.G.S. § 9-612(f)(1), has made any **campaign contributions** to, or solicited any contributions on behalf of, any exploratory committee, candidate committee, political committee, or party committee established by, or supporting or authorized to support, any candidate for statewide public office, in violation of C.G.S. § 9-612(f)(2)(A). I further certify that **all lawful campaign contributions** that have been made on or after January 1, 2011 by the Contractor or any of its principals, as defined in C.G.S. § 9-612(f)(1), to, or solicited on behalf of, any exploratory committee, candidate committee, political committee, or party committee established by, or supporting or authorized to support any candidates for statewide public office or the General Assembly, are listed below:

Lawful Campaign Contributions to Candidates for Statewide Public Office:

Contribution Date	Name of Contributor	Recipient	Value	Description

Lawful Campaign Contributions to Candidates for the General Assembly:

Contribution Date	Name of Contributor	Recipient	Value	Description

Sworn as true to the best of my knowledge and belief, subject to the penalties of false statement.

Printed Contractor Name

Printed Name of Authorized Official

Signature of Authorized Official

Subscribed and acknowledged before me this day of , 20

Commissioner of the Superior Court (or Notary Public)

My Commission Expires

OPM Ethics Form 5 Rev. 3-28-14

STATE OF CONNECTICUT
CONSULTING AGREEMENT AFFIDAVIT

Affidavit to accompany a bid or proposal for the purchase of goods and services with a value of $50,000 or more in a calendar or fiscal year, pursuant to Connecticut General Statutes §§ 4a-81(a) and 4a-81(b). For sole source or no bid contracts the form is submitted at time of contract execution.

INSTRUCTIONS:

If the bidder or vendor has entered into a consulting agreement, as defined by Connecticut General Statutes § 4a-81(b)(1): Complete all sections of the form. If the bidder or contractor has entered into more than one such consulting agreement, use a separate form for each agreement. Sign and date the form in the presence of a Commissioner of the Superior Court or Notary Public. **If the bidder or contractor has not entered into a consulting agreement, as defined by Connecticut General Statutes § 4a-81(b)(1):** Complete only the shaded section of the form. Sign and date the form in the presence of a Commissioner of the Superior Court or Notary Public.

Submit completed form to the awarding State agency with bid or proposal. For a sole source award, submit completed form to the awarding State agency at the time of contract execution.

This affidavit must be amended if there is any change in the information contained in the most recently filed affidavit not later than (i) thirty days after the effective date of any such change or (ii) upon the submittal of any new bid or proposal, whichever is earlier.

AFFIDAVIT: [Number of Affidavits Sworn and Subscribed On This Day: _____]

I, the undersigned, hereby swear that I am a principal or key personnel of the bidder or contractor awarded a contract, as described in Connecticut General Statutes § 4a-81(b), or that I am the individual awarded such a contract who is authorized to execute such contract. I further swear that I have not entered into any consulting agreement in connection with such contract, **except for the agreement listed below**:

_____ _____
Consultant's Name and Title Name of Firm (if applicable)

_____ _____ _____
Start Date End Date Cost

Description of Services Provided: _____
_____

Is the consultant a former State employee or former public official? ☐ YES ☐ NO
If YES: _____ _____
Name of Former State Agency Termination Date of Employment

Sworn as true to the best of my knowledge and belief, subject to the penalties of false statement.

_____ _____
Printed Name of Bidder or Contractor **Signature of Principal or Key Personnel** **Date**

_____ _____
Printed Name (of above) Awarding State Agency

Sworn and subscribed before me on this _____ day of _____, 20___.

_____
Commissioner of the Superior Court
or Notary Public

_____
My Commission Expires

FORM OF PROPOSAL

All pages within the Form of Proposal must be completed, signed by a duly authorized representative of the firm and returned as part of the bid/proposal/RFQ response package. NO FACSIMILE SIGNATURE PERMITTED

- √ **If the form of proposal is being submitted by a Joint Venture, each Joint Venture shall sign the Proposal, and each Joint Venture agrees to be bound by the terms and conditions thereof.**
- √ **Failure to submit ALL REQUIRED forms constitutes grounds for rejection of your bid/proposal/RFQ.**
- √ **If it is determined by the University of Connecticut and/or State of Connecticut that any information requested but not referenced and submitted with this bid/proposal; such determination will be just cause for disqualification of the bid/proposal.**

(TO BE FILLED IN AND SIGNED BY THE BIDDER)

Signed the _____ day of _____ 20____.

Firm Name: _____

Street: _____

City/State/Zip Code: _____

Telephone Number: _____

Fax Number: _____

Duly Authorized/Title: _____

(TO BE FILLED IN AND SIGNED BY JOINT VENTURE IF APPLICABLE)

Firm Name: _____

Street: _____

City/State/Zip Code: _____

Telephone Number: _____

Fax Number: _____

Duly Authorized/Title: _____

Duly Authorized/Title: _____

End of Form of Proposal

Contractor's Initials:_____

THIS IS A PUBLIC WORKS PROJECT

Covered by the

PREVAILING WAGE LAW

CT General Statutes Section 31-53

If you have QUESTIONS regarding your wages
CALL (860) 263-6790

Section 31-55 of the CT State Statutes requires every contractor or subcontractor performing work for the state to post in a prominent place the prevailing wages as determined by the Labor Commissioner.

Section 31-53b

Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions. (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268. (b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section. (c) Not later than January 1, 2009, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with Federal Mine Safety and Health Administration Standards or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project. (d) This section shall not apply to employees of public service companies, as defined in section 16-1, 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.

(P.A. 06-175, S. 1; P.A. 08-83, S. 1.)

History: P.A. 08-83 amended Subsec. (a) by making provisions applicable to public works project contracts entered into on or after July 1, 2009, replacing provision re total cost of work with reference to Sec. 31-53(g), requiring proof in certified payroll form that new mechanic, laborer or worker has completed a 10-hour or more construction safety course and adding provision re new miner training program, amended Subsec. (b) by substituting "person" for "employee" and adding "or program", amended Subsec. (c) by adding "or in

accordance with Federal Mine Safety and Health Administration Standards" and setting new deadline of January 1, 2009, deleted former Subsec. (d) re "public building", added new Subsec. (d) re exemptions for public service company employees and delivery drivers who perform no labor other than delivery and made conforming and technical changes, effective January 1, 2009.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE, PROGRAM OR TRAINING

(Applicable to public works contracts as described by Conn. Gen. Stat. § 31-53(g) entered into *on or after July 1, 2009*)

(1) This requirement was created by Public Act No. 08-83, which is codified in Section 31-53b of the Connecticut General Statutes;

(2) The course, program or training is required for public works contracts as described by Conn. Gen. Stat. § 31-53(g) entered into on or after July 1, 2009;

(3) It is required of private workers (not state or municipal workers) and apprentices who perform the work of a mechanic, laborer or worker pursuant to the classifications of labor under Conn. Gen. Stat. § 31-53 on a public works project as described by Conn. Gen. Stat. § 31-53(g);

(4) The ten-hour construction safety and health course, program or training pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, a new mining training program approved by the Federal Mine Safety and Health Administration in accordance with 30 C.F. R. 48, or, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;

(5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;

(6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;

(7) Proof of course, program or training completion shall be demonstrated through the presentation of a "completion document" (card, document, certificate or other written record issued by federal OSHA or by the Federal Mine Safety and Health Administration) as defined by Conn. State Agencies Regs. § 31-53b-1(2).

(8) Any completion document with an issuance date more than 5 years prior to the commencement date of the public works project shall not constitute proof of compliance with § 31-53b;

(9) For each person who performs the duties of a mechanic, laborer or worker on a public works project, the contractor shall affix a copy of the completion document

to the certified payroll required to be submitted to the contracting agency for such project on which such worker's name first appears;

(10) Any mechanic, laborer or worker on a public works project found to be in non-compliance shall be subject to removal from the project if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;

(11) Any such employee who is determined to be in noncompliance may continue to work on a public works project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;

(12) The statute provides the minimum standards required for the completion of a construction safety and health course, program or training by employees on public works contracts; any contractor can exceed these minimum requirements.;

(13) Regulations pertaining to § 31-53b are located at Conn. State Agencies Regs. §31-53b-1 *et seq.*, and are effective May 5, 2009. The regulations are posted on the CTDOL website;

(14) Any questions regarding this statute or the regulations may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTMATELY ARISE CONCERNING THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

November 29, 2006

Notice

To All Mason Contractors and Interested Parties Regarding Construction Pursuant to Section 31-53 of the Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute.
Over the past few years the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute. The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- Laborers (Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine feet only.

- Power Equipment Operator (Group 9) - operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007 the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

STATUTE 31-55a

- SPECIAL NOTICE -

To: All State and Political Subdivisions,Their Agents, and Contractors
Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.

- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

- It is the ***contractor's*** responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.

- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

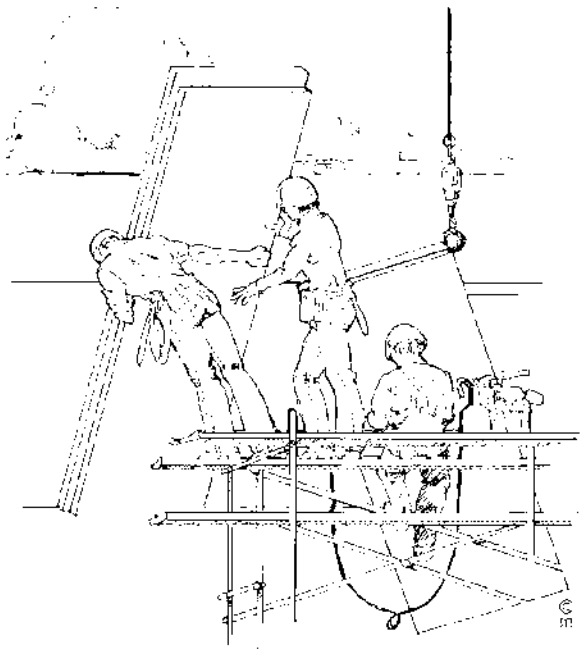
~NOTICE~

TO ALL CONTRACTING AGENCIES

Please be advised that Connecticut General Statutes Section 31-53, requires the contracting agency to certify to the Department of Labor, the total dollar amount of work to be done in connection with such public works project, regardless of whether such project consists of one or more contracts.

Please find the attached "Contracting Agency Certification Form" to be completed and returned to the Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit.

✎ Inquiries can be directed to (860)263-6543.



CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION
CONTRACT COMPLIANCE UNIT

CONTRACTING AGENCY CERTIFICATION FORM

I, _____, acting in my official capacity as _____,
authorized representative title

for _____, located at _____,
contracting agency address

do hereby certify that the total dollar amount of work to be done in connection with

_____, located at _____,
project name and number address

shall be $_____, which includes all work, regardless of whether such project

consists of one or more contracts.

CONTRACTOR INFORMATION

Name:_____

Address:_____
Authorized Representative:_____
Approximate Starting Date: _____

Approximate Completion Date:_____

_____ _____
Signature Date

Return To: Connecticut Department of Labor
Wage & Workplace Standards Division
Contract Compliance Unit
200 Folly Brook Blvd.
Wethersfield, CT 06109

Date Issued: _____

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM

Construction Manager at Risk/General Contractor/Prime Contractor

I,_____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

_____
Street

_____
City

and all of its subcontractors will pay all workers on the

_____
Project Name and Number

_____
Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

_____
Signed

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

_____
Notary Public

Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

CERTIFIED PAYROLL FORM WWS - CPI

In accordance with Connecticut General Statutes, 31-53 Certified Payrolls with a statement of compliance shall be submitted monthly to the contracting agency.

Note: Once you have downloaded these forms and are ready to print them out, set the print function on your PC to the horizontal print orientation.

Note2: Please download both the Payroll Certification for Public Works Projects **and** the Certified Statement of Compliance for a complete package. The Certified Statement of Compliance appears on the same page as the Fringe Benefits Explanation page.

Announcement: The Certified Payroll Form WWS-CPI can now be completed on-line!

- Certified Payroll Form WWS-CPI (PDF, 727KB)
- Sample Completed Form (PDF, 101KB)

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

In accordance with Connecticut General Statutes, 31-53
Certified Payrolls with a statement of compliance
shall be submitted monthly to the contracting agency.

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

WEEKLY PAYROLL

Connecticut Department of Labor
Wage and Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

CONTRACTOR NAME AND ADDRESS:

SUBCONTRACTOR NAME & ADDRESS

WORKER'S COMPENSATION INSURANCE CARRIER

POLICY #

EFFECTIVE DATE:
EXPIRATION DATE:

PAYROLL NUMBER | Week-Ending Date | PROJECT NAME & ADDRESS

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE S	M	T	W	TH	F	S	Total ST Hours Total O/T Hours	BASE HOURLY RATE TOTAL FRINGE BENEFIT PLAN CASH	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS FICA	FEDERAL WITH-HOLDING	STATE WITH-HOLDING	LIST OTHER	GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
				HOURS WORKED EACH DAY								$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							
												$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							
												$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							
												$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							

12/9/2013
WWS-CP1

*IF REQUIRED

*SEE REVERSE SIDE

PAGE NUMBER _____OF

OSHA 10 ~ATTACH CARD TO 1ST CERTIFIED PAYROLL

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker's compensation, income taxes, etc.).

Please specify the type of benefits provided:

1) Medical or hospital care _____ 4) Disability_____

2) Pension or retirement _____ 5) Vacation, holiday_____

3) Life Insurance _____ 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of _____,

I, _____of _____, (hereafter known as

Employer) in my capacity as _____ (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

a) The records submitted are true and accurate;

b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;

c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);

d) Each such person is covered by a worker's compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;

e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and

f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA~The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such persons name first appears.

_____ _____ _____

(Signature) (Title) Submitted on (Date)

*****THIS IS A PUBLIC DOCUMENT*****
*****DO NOT INCLUDE SOCIAL SECURITY NUMBERS*****

Weekly Payroll Certification For
Public Works Projects (Continued)

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

WEEKLY PAYROLL

Week-Ending Date:
Contractor or Subcontractor Business Name:

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION / Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE S	M	T	W	TH	F	S	Total ST Hours / Total O/T Hours	BASE HOURLY RATE / TOTAL FRINGE BENEFIT PLAN CASH	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS FICA	FEDERAL WITH-HOLDING	STATE WITH-HOLDING	LIST OTHER	GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
			HOURS WORKED EACH DAY																	
												$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							
												$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							
												$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							
												$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							
												$ Base Rate $ Cash Fringe	1. $ 2. $ 3. $ 4. $ 5. $ 6. $							

*IF REQUIRED

NOTICE: THIS PAGE MUST BE ACCOMPANIED BY A COVER PAGE (FORM # WWS-CP1)

OCCUPATIONAL CLASSIFICATION BULLETIN

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53.

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification.

Below are additional clarifications of specific job duties performed for certain classifications:

- **ASBESTOS WORKERS**
  - Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.
- **ASBESTOS INSULATOR**
  - Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.
- **BOILERMAKERS**
  - Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.
- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**
  - Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.
- **CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS**
  - Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation

of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **CLEANING LABORER**

  - The clean up of any construction debris and the general cleaning, including sweeping, wash down, mopping, wiping of the construction facility, washing, polishing, dusting, etc., prior to the issuance of a certificate of occupancy falls under the *Labor classification.*

- **DELIVERY PERSONNEL**

  - If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

  - An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer/tradesman and not a delivery personnel.

- **ELECTRICIANS**

  - Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ***License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.**

- **ELEVATOR CONSTRUCTORS**

  - Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. ***License required by Connecticut General Statutes: R-1,2,5,6.**

- **FORK LIFT OPERATOR**

  - Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

  - Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.

- **GLAZIERS**

  - Glazing wood and metal sash, doors, partitions, and 2 story aluminum

storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce.

- **IRONWORKERS**
  - Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce. Insulated metal and insulated composite panels are still installed by the Ironworker.
- **INSULATOR**
  - Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings. Past practice using the applicable licensed trades, Plumber, Sheet Metal, Sprinkler Fitter, and Electrician, is not inconsistent with the Insulator classification and would be permitted.
- **LABORERS**
  - Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.
- **PAINTERS**
  - Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hanging+ for any and all types of building and residential work.
- **LEAD PAINT REMOVAL**
  - Painter’s Rate

1. Removal of lead paint from bridges.

2. Removal of lead paint as preparation of any surface to be repainted.

3. Where removal is on a Demolition project prior to reconstruction.

- Laborer's Rate

1. Removal of lead paint from any surface NOT to be repainted.

2. Where removal is on a *TOTAL* Demolition project only.

- **PLUMBERS AND PIPEFITTERS**

  - Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ***License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***

- **POWER EQUIPMENT OPERATORS**

  - ates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ***License required, crane operators only, per Connecticut General Statutes.**

- **ROOFERS**

  - Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (tear-off and/or removal of any type of roofing and/or clean-up of any and all areas where a roof is to be relaid)

- **SHEETMETAL WORKERS**

  - Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, facia, louvers, partitions, wall panel siding, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Insulated metal and insulated composite panels are still installed by the Iron Worker. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal

and composite lockers and shelving, kitchen equipment, and walk-in coolers.

- **SPRINKLER FITTERS**

  - Installation, alteration, maintenance and repair of fire protection sprinkler systems. ***License required per Connecticut General Statutes: F-1,2,3,4.**

- **TILE MARBLE AND TERRAZZO FINISHERS**

  - Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

- **TRUCK DRIVERS**

  - **Definitions:**

    - 1) "Site of the work" (29 Code of Federal Regulations (CFR) 5.2(l)(b) is the physical place or places where the building or work called for in the contract will remain and any other site where a significant portion of the building or work is constructed, provided that such site is established specifically for the performance of the contact or project;

      - (a) Except as provided in paragraph (l) (3) of this section, job headquarters, tool yards, batch plants, borrow pits, etc. are part of the "site of the work"; provided they are dedicated exclusively, or nearly so, to the performance of the contract or project, and provided they are adjacent to "the site of work" as defined in paragraph (e)(1) of this section;

      - (b) Not included in the "site of the work" are permanent home offices, branch plant establishments, fabrication plants, tool yards etc, of a contractor or subcontractor whose location and continuance in operation are determined wholly without regard to a particular State or political subdivision contract or uncertain and indefinite periods of time involved of a few seconds or minutes duration and where the failure to count such time is due to consideration justified by industrial realities (29 CFR 785.47)

    - 2) "Engaged to wait" is waiting time that belongs to and is controlled by the employer which is an integral part of the job and is therefore compensable as hours worked. (29 CFR 785.15)

    - 3) "Waiting to be engaged" is waiting time that an employee can use effectively for their own purpose and is not compensable as hours worked. (29 CFR 785.16)

    - 4) "De Minimus" is a rule that recognizes that unsubstantial or insignificant periods of time which cannot as a practical administrative matter be precisely recorded for payroll purposes, may be disregarded. This rule applies only where there are uncertain and indefinite periods of time involved of a short duration and where the failure to count such

time is due to consideration justified by worksite realities. For example, with respect to truck drivers on prevailing wage sites, this is typically less than 15 minutes at a time.

- **Coverage of Truck Drivers on State or Political subdivision Prevailing Wage Projects**

  - Truck drivers **are covered** for payroll purposes under the following conditions:

    - Truck Drivers for time spent working on the site of the work.

    - Truck Drivers for time spent loading and/or unloading materials and supplies on the site of the work, if such time is not de minimus

    - Truck drivers transporting materials or supplies between a facility that is deemed part of the site of the work and the actual construction site.

    - Truck drivers transporting portions of the building or work between a site established specifically for the performance of the contract or project where a significant portion of such building or work is constructed and the physical places where the building or work outlined in the contract will remain.

  For example: Truck drivers delivering asphalt are covered under prevailing wage while" engaged to wait" on the site and when directly involved in the paving operation, provided the total time is not "de minimus"

  - Truck Drivers **are not** covered in the following instances:

    - Material delivery truck drivers while off "the site of the work"

    - Truck Drivers traveling between a prevailing wage job and a commercial supply facility while they are off the "site of the work"

    - Truck drivers whose time spent on the "site of the work" is de minimus, such as under 15 minutes at a time, merely to drop off materials or supplies, including asphalt.

These guidelines are similar to U.S. Labor Department policies. The application of these guidelines may be subject to review based on factual considerations on a case by case basis.

For example:

- Material men and deliverymen are not covered under

prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.

- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

Any questions regarding the proper classification should be directed to:

Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543

Rev. 07/13

Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES

Please Note: If the "Benefits" listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

- Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

- If the "Benefits" section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and (Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)

a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics
a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.

b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers
a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

Minimum Rates and Classifications for Building Construction

ID# 20-10263

Connecticut Department of Labor
Wage and Workplace Standards

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay

Project Number: #901667
Project Town: Mansfield
State#: UCONN
FAP#: #901667
Project: Air Conditioning Fine Arts Center

CLASSIFICATION	Hourly	Benefits
1a) Asbestos Worker/Insulator (Includes application of insulating materials, protective coverings, coatings, & finishes to all types of mechanical systems; application of firestopping material for wall openings & penetrations in walls, floors, ceilings	38.25	27.96
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	40.21	30.99
2) Boilermaker	38.34	26.01
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	35.71	33.31 + a
3b) Tile Setter	34.9	25.87
3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
3d) Tile, Marble & Terrazzo Finishers	26.7	21.75
3e) Plasterer	33.48	32.06
------LABORERS------		
4) Group 1: Laborers (common or general), acetylene burners, carpenter tenders, concrete specialists, wrecking laborers, fire watchers.	30.75	20.84

As of: February 20, 2020

4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman (Person running mixer and spraying fireproof only).	31.0	20.84
4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	31.25	20.84
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is $26.80.	31.75	20.84
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	31.5	20.84
4e) Group 6: Blasters, nuclear and toxic waste removal.	33.75	20.84
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	31.75	20.84
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	29.03	20.84
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	28.49	20.84
4i) Group 10: Traffic Control Signalman	18.0	20.84
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	33.53	25.66
5a) Millwrights	34.94	26.19
6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	40.0	27.67+3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	53.37	33.705+a+b
-----LINE CONSTRUCTION----		
Groundman	26.5	6.5% + 9.00
Linemen/Cable Splicer	48.19	6.5% + 22.00

As of: February 20, 2020

8) Glazier (Trade License required: FG-1,2)	38.18	21.80 + a
9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	36.67	35.77
----OPERATORS----		
Group 1: Crane handling or erecting structural steel or stone, hoisting engineer 2 drums or over, front end loader (7 cubic yards or over), work boat 26 ft. and over and Tunnel Boring Machines. (Trade License Required)	40.97	24.80 + a
Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	40.64	24.80 + a
Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Fine Grade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	39.88	24.80 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	39.48	24.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24	38.87	24.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	38.87	24.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	38.55	24.80 + a
Group 7: Asphalt roller, concrete saws and cutters (ride on types), vermeer concrete cutter, Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24	38.2	24.80 + a
Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	37.79	24.80 + a
Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder).	37.34	24.80 + a
Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	35.24	24.80 + a

Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	35.24	24.80 + a
Group 12: Wellpoint operator.	35.18	24.80 + a
Group 13: Compressor battery operator.	34.58	24.80 + a
Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	33.41	24.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	32.99	24.80 + a
Group 16: Maintenance Engineer/Oiler.	32.32	24.80 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	36.76	24.80 + a
Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	34.26	24.80 + a
------PAINTERS (Including Drywall Finishing)------		
10a) Brush and Roller	34.62	21.80
10b) Taping Only/Drywall Finishing	35.37	21.80
10c) Paperhanger and Red Label	34.12	21.05
10e) Blast and Spray	36.62	21.05
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	43.62	32.06
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
13) Roofer (composition)	37.6	20.65
14) Roofer (slate & tile)	38.1	20.65
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	37.98	38.31

16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	43.62	32.06
------TRUCK DRIVERS------		
17a) 2 Axle	29.51	24.52 + a
17b) 3 Axle, 2 Axle Ready Mix	29.62	24.52 + a
17c) 3 Axle Ready Mix	29.67	24.52 + a
17d) 4 Axle, Heavy Duty Trailer up to 40 tons	29.72	24.52 + a
17e) 4 Axle Ready Mix	29.77	24.52 + a
17f) Heavy Duty Trailer (40 Tons and Over)	29.98	24.52 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	29.77	24.52 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	45.57	24.33 + a
19) Theatrical Stage Journeyman	25.76	7.34

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.*

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $4.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)

2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

As of: February 20, 2020

Project: Air Conditioning Fine Arts Center

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: February 20, 2020

AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor *where the basis of payment is a Stipulated Sum*

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101™–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

AIA A101-2017 FOR ON-CALL TRADE (FOR CONTRACTS OF $500,000 OR LESS)
Rev. 6-6-19

AGREEMENT made and effective as of the date that the Agreement is fully executed by the parties hereto.
(Paragraph deleted)
BETWEEN the Owner:
(Name, address and other information)

and the Contractor:
(Name, address and other information)

for the following Project:
(Name, location and description)

The Architect:
(Name, address and other information)

The Owner and Contractor agree as follows:

The Contractor is a participant in the University of Connecticut's On-Call Trade Labor Program. This Contract has been issued under that program pursuant to the terms and

Init.
/

conditions of the Master Agreement for On-Call Trade Contractor Services between the Owner and the Contractor which was executed by the Owner on _____(the "Master Agreement").

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of the Master Agreement, this Agreement, the AIA A201-2017 General Conditions, as modified by the Owner prior to the execution of this Agreement (as so modified, the "General Conditions"), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

§ 2.1 The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[X] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)
(Paragraphs deleted)

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[ ] Not later than ( ) days from the date of commencement of the Work.

[ ] By the following date:

In addition to the foregoing, the Work shall be performed in general conformance with the preliminary construction schedule attached hereto as **Exhibit D**. Upon the Owner's approval of the construction schedule to be submitted by the Contractor pursuant to the requirements set forth in Section 3.10.1 of the General Conditions, such preliminary construction schedule shall be superseded and replaced by such approved construction schedule.

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

(Paragraph deleted)

§ 4.2.1 The Contract Sum is based upon and includes the following alternates, if any, which are further described in the Contract Documents and are hereby accepted by the Owner.

All alternate prices set forth in this Section 4.2.1 and in Section 4.2.2 below are "All-Inclusive Prices". For the purposes of this Agreement an "All Inclusive Price" is a price for a portion of the Work which represents the total cost to the Owner for the Contractor's performance, furnishing and installation of such portion of the Work including, without limitation, overhead and profit thereon. Alternate prices are good for both adds and deducts.

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.

(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:

(Identify each allowance.)

Item	Price

§ 4.4 Unit prices applicable to the Work, if any, are set forth below (the "Unit Prices").

Unit Prices shall be valid for the life of the Project and represent All-Inclusive Prices. Unit prices are good for both adds and deducts.

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated Damages:
It is acknowledged that the Contractor's failure to achieve Substantial Completion of the Work within the Contract Time provided by the Contract Documents will cause the Owner to incur substantial economic damages and losses of types and in amounts which are impossible to compute and ascertain with certainty as a basis for recovery by the Owner of actual damages, and that liquidated damages represent a fair, reasonable and appropriate estimate thereof. Accordingly, in lieu of actual damages for such delay, the Contractor agrees that liquidated damages may be assessed and recovered by the Owner as against the Contractor and its Surety in the event of delayed completion, without the Owner being required to present any evidence of the amount or character of actual damages sustained by reason thereof.

Therefore, the Contractor shall be liable to the Owner for payment of liquidated damages in the amount of _____ Dollars ($_____) for each day that Substantial Completion is delayed beyond the date set forth herein for the achievement of Substantial Completion, as adjusted for time extensions as may have been granted pursuant to the terms and conditions of the Contract Documents. Such liquidated damages are intended to represent estimated actual damages and are not intended as a penalty, and the Contractor shall pay them to the Owner without limiting the Owner's right to terminate this Agreement as provided elsewhere herein.

If, pursuant to Section 3.3.2, the Contractor is required to achieve Substantial Completion of any portion of the Work prior to the date required for the Substantial Completion of the entirety of the Work, the Owner shall be entitled to assess the foregoing liquidated damages for the failure of the Contractor to complete such portion of the Work by the applicable Substantial Completion Date reflected in Section 3.3.2, as adjusted for time extensions as may have been granted pursuant to the terms and conditions of the Contract Documents.

The collection of liquidated damages by the Owner under this Section 4.5 shall be in addition to, and not in lieu of, the Owner's right to recover from the Contractor the Owner's increased costs to complete the Project arising from the Contractor's delay. Further, such liquidated damages shall in no way limit the Owner's other rights under this Agreement or the Owner's entitlement to damages for any other injury, damage or loss, other than for delay, for which the Contractor may be responsible.

§ 4.6
(Paragraphs deleted)
Not Used.

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.

§ 5.1.3 The Owner shall make payments of amounts certified by the Architect and properly due to the Contractor under each Application for Payment within thirty (30) days after the Owner's and the Architect's receipt of such Application for Payment, provided it is properly submitted, correct and accepted by the Owner in accordance with the provisions of Article 9 of the General Conditions.

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect and the Owner may require. This schedule unless objected to by the Architect or the Owner shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to the provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work; and

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, and, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of the General Conditions;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of the General Conditions;

.5 Retainage withheld pursuant to Section 5.1.8; and

.6 Any additional amounts required by law to be withheld by the Owner due to the Contractor's failure to comply with its obligations under Connecticut General Statutes Sections 4a-60, 4a-60(a) or Sections 46a-68c to 46a-68f, inclusive. Unless otherwise required by applicable law, the Owner shall withhold two percent (2%) of each progress payment (the "CHRO Holdback") until such time as the Connecticut Commission on Human Rights and Opportunities ("CHRO") notifies the Owner that it may release the CHRO Holdback to the Contractor.

§ 5.1.7 In addition to the foregoing, the Owner shall make the following payments:

(Paragraphs deleted)

§5.1.7.1 Upon determination by the Owner that "Fifty Percent of the Contract is Completed", the Owner shall calculate the "Excess Retainage Amount" and shall pay the "Excess Retainage Amount" to the Contractor within ninety days after the Owner's receipt of the Application for Payment that first reflects that "Fifty Percent of the Contract is Completed".

§5.1.7.2 Upon Substantial Completion of the Work, the Contractor shall be entitled to payment of the balance of the Contract Sum net of amounts the Owner determines for incomplete or nonconforming Work, retainage applicable to such incomplete or nonconforming Work, the CHRO Holdback, as applicable, and unsettled claims.

§5.1.7.3 Upon acceptance and written consent of the Contractor's surety, if any, and a written statement from the CHRO releasing the Owner from any obligation to withhold the CHRO Holdback, the Contractor shall be entitled to payment of the CHRO Holdback.

§5.1.7.4 If final completion of the Work is materially delayed through no fault of the Contractor, any Subcontractor, Sub-subcontractor or any other party for whom any of them is responsible, the Contractor shall be entitled to payment of any amounts payable in accordance with Section 9.10.3 of the General Conditions.

§ 5.1.8 Retainage

§ 5.1.8.1 For Applications for Payment Prior to Determination that Fifty Percent of the Contract is Completed:
Retainage withheld by the Owner shall be seven and one-half percent (7.5%) of each progress payment.

§ 5.1.8.2 For Applications for Payment Following Determination that Fifty Percent of the Contract is Completed: Retainage withheld by the Owner shall be five percent (5.0%) of each progress payment.

§ 5.1.8.3 The Contractor shall not withhold retainage from any Subcontractor in excess of that withheld by the Owner in connection with such Subcontractor's Work. The Contractor shall release retainage to each Subcontractor upon the Contractor's receipt of retainage from the Owner attributable to the Work performed by such Subcontractor.

§ 5.1.8.4 For the purposes of Section 5.1.7 above and this Section 5.1.8, the following terms shall have the following meanings:

§ 5.1.8.4.1 "Fifty Percent of the Contract is Completed" is the stage in the progress of the Work when Certificates for Payment have been issued by the Architect and payment thereof approved by the Owner for an aggregate amount equal to fifty percent (50%) of the Contract Sum, as it may have been adjusted in accordance with the Contract Documents. For the purposes of this subsection 5.1.8.4.1, the Contract Sum shall include amounts payable for pending construction change orders and other pending change directives described in Section 9.3.1.1 of the General Conditions and excludes any amounts paid by joint check pursuant to Section 9.5.4 of the General Conditions.

§ 5.1.8.4.2 "Excess Retainage Amount" shall mean the amount by which the total retainage then withheld by the Owner exceeds the amount of retainage that would have then been withheld by the Owner if the applicable retainage withheld thus far had been based on five percent (5%) of each progress payment made instead of seven and one-half percent (7.5%).

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Work and all of its obligations under the Contract Documents (including, without limitation, those set forth in Section 9.10.2 of the General Conditions) except for the Contractor's responsibility to correct Work as provided in Article 12 of the General Conditions, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than thirty (30) days after the conditions set forth in Section 5.2.1 have been met subject to the provisions of Article 9 of the General Conditions.

(Paragraphs deleted)

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Associate Vice President for University Planning, Design and Construction for the Owner (or his/her designee) or, in the case of a project for UCONN Health ("UCH"), UCH's Associate Vice President for Facilities Development & Operations (or his/her designee) or their respective successors in function will serve as the Initial Decision Maker pursuant to Article 15 of the General Conditions, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(Paragraphs deleted)

§ 6.2

(Paragraphs deleted)

Not Used.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of the General Conditions.

(Paragraphs deleted)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of the General Conditions.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of the General Conditions or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner Representative

(Paragraphs deleted)

Prior to the commencement of the Work, the Owner shall provide the Contractor with the name and contact information (including an email address for notice pursuant to Section 8.6) for the individual who will serve as the Owner's designated representative and primary point of contact for the Contractor's day to day communications with the Owner. Except as otherwise expressly provided in the Contract Documents, such individual shall not have the authority to approve or execute Change Orders, or other amendments to the Contract. Claims shall be submitted as provided in Article 15 of the General Conditions.

§ 8.3 The Contractor's Representative

(Name, address, email address, and other information)

_____

§ 8.4 The Contractor's representative shall not be changed without ten days' prior notice to the Owner.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in **Exhibit A** attached hereto and as provided elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as described in Article 11 of the General Conditions.

§ 8.6 Notice in electronic

(Paragraphs deleted)

format for the purposes of Section 1.6.1 of the General Conditions from one party to this Agreement to the other shall be transmitted by electronic mail to the email address for the designated representative of the receiving party as provided in Sections 8.2 and 8.3 of this Agreement.

§ 8.7 Other Provisions

§ 8.7.1 The Contractor is hereby specifically cautioned that unless specifically authorized, in writing, by the University's Vice President of Communications or successor in function, on a case by case basis, the Contractor shall have no right to use, and shall not use, in any manner, the name of the University of Connecticut, its officials or employees, or the Seal of the University:
(a) in any advertising, publicity or promotion; or
(b) to express or to imply any endorsement by the Owner of the Contractor's work product or services.

§ 8.7.2 The Contractor shall comply, and shall require all Subcontractors, Sub-subcontractors and suppliers to comply, with all of the State Requirements set forth on **Exhibit F** to the extent applicable.

§ 8.7.3 This Agreement may be executed in counterparts, and each counterpart shall have the same force and effect as an original and, when taken together, shall constitute one and the same instrument and an effective binding agreement on the part of each of the undersigned. Execution of a facsimile or PDF copy shall have the same force and effect as execution of an original. Signed copies of this Agreement may be faxed or e-mailed with the same force and effect as if the originally executed Agreement had been delivered.

§ 8.8 Joint Venture/General Partnership

§ 8.8.1 If the Contractor is a joint venture or a general partnership, each member of the joint venture (a "Member") or partner of the partnership (a "Partner"), as applicable, shall be jointly, severally and individually responsible to the Owner for the performance of all obligations of the Contractor under the Contract Documents and jointly, severally and individually liable to the Owner for the Contractor's failure to perform such obligations. In its dealings with the Owner, each Member or Partner, as applicable, shall have full authority to act on behalf of and to bind the Contractor as well as all Members or Partners, as applicable. Each Member or Partner, as applicable, shall be considered to be the agent of the Contractor and of all other Members or Partners.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after the execution of this Agreement, are enumerated below:

.1 This Agreement

.2 **Exhibit A,** Insurance

.3 The General Conditions

.4 The Master Agreement

.5 Drawings prepared by _____and dated _____, and listed on the List of Drawings attached as **Exhibit B,** as the same may have been modified or supplemented by the Bid Clarifications and Addenda.

.6 Specifications prepared by _____and dated _____, and which are listed in the Table of Contents attached as **Exhibit C,** as the same may have been modified or supplemented by the Bid Clarifications and Addenda.

(Paragraph deleted)

.7 Bid Clarifications and Addenda, if any, are as follows:

Number	Date	Pages

.8 Other Exhibits:

Exhibit D - Preliminary Construction Schedule

(Table deleted)

Exhibit E - Labor Rates

Exhibit F - State Requirements

(Table deleted)

.9 Other documents, if any, forming part of the Contract Documents are listed below:

(Paragraph deleted)

i. Invitation to Bid for the Project issued by the Owner on _____, _____including all exhibits and schedule attached thereto and all other documents incorporated therein by reference.

(Paragraph deleted)

ii. The Owner's Contractor Environmental, Health & Safety Manual current as of the date of the execution of this Agreement by the Owner.

(Paragraphs deleted)

iii. The Owner's Code of

(Table deleted)

Conduct current as of the date of the execution of this Agreement by the Owner.

Signed and agreed by:

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*
Date:	Date:

EXHIBIT A
INSURANCE REQUIREMENTS

I. CONTRACTOR'S LIABILITY INSURANCE

A. The Contractor shall maintain with a company or companies lawfully authorized to do business in the State of Connecticut such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

1. Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
2. Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
4. Claims for damages insured by usual personal injury liability coverage;
5. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
6. Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
7. Claims for bodily injury or property damage arising out of completed operations; and
8. Claims involving contractual liability applicable to the Contractor's obligations under Section 3.18 of the General Conditions.

B. The insurance required by Section A above shall be written for not less than the limits of liability set forth below or required by law, whichever coverage is greater. Coverages shall be maintained without interruption from the date of commencement of the Work until the date of final payment and, (i) with respect to coverage required to be maintained under the Contract Documents for a period of time after final payment, for such additional period of time, and, (ii) with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work and for such additional period as may be specified in the Contract Documents. Coverage for all insurance policies shall be on an occurrence basis, with the exception of the Pollution Liability coverage described in Section I.B.6 herein, which may be on a claims-made basis.

1. **Worker's Compensation Insurance**: Worker's Compensation Insurance in Statutory Limits of the Worker's Compensation Laws of the State of Connecticut, and other extensions, with Coverage B – Employer's Liability of not less than limits of $1,000,000 – Each Accident, $1,000,000 – Policy Limit and $1,000,000 – Each Employee. Coverage under the Broad Form All State extension shall also be included.
2. **Commercial General Liability Insurance**: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage, with no exclusions for hazards of operations (including but not limited to elevators, explosion, collapse and/or underground hazards). Coverage shall include Premises and Operations, Independent Contractors, Products and Completed Operations, Contractual Liability and Broad Form Property Damage coverage. If a general aggregate is used, the general aggregate limit shall apply separately to the project or the general aggregate limit shall be twice the occurrence limit. The coverage shall contain no special limitations on the scope of protection afforded to the State. Said policy shall also state that it is primary insurance. Completed operations coverage shall be maintained for a period of three (3) years after final completion of the Work.
3. **Automobile Liability Insurance**: Automobile Liability Insurance covering all owned, non-owned and hired automobiles, trucks and trailers of the respective parties required to provide and maintain this insurance. Such insurance shall provide coverage not less than that of the Standard Comprehensive Automobile Liability policy in limits not less than, as respects Contractor and all tiers of Subcontractors, $1,000,000 Combined Single Limit each occurrence for Bodily Injury and Property Damage.

4. **Umbrella Liability Insurance**: Umbrella liability (following form) in the amount of $5,000,000 per Occurrence.
5. **Aircraft Liability**: If aircraft of any kind is used by the Contractor, any tier of Subcontractor or by anyone else on their behalf, the Contractor or Subcontractor shall maintain or cause the operator of the aircraft to maintain aircraft public liability insurance insuring passengers and the general public against personal injury, bodily injury or property damage arising from aircraft owned, used, operated or hired in connection with the Work by the Contractor, Subcontractor or anyone else in limits of $50,000,000 Combined Single Limit for any one occurrence, each aircraft. If the aircrafts to be used are unmanned aircrafts, the Contractor, Subcontractor or operator of the aircraft may be permitted by the Owner to maintain other coverages and limits than as provided herein for aircrafts generally if approved by the Owner in writing in advance of the use of such unmanned aircrafts
6. **Contractor's Pollution Liability**: If the work of this project includes the abatement, removal, cleanup or handling of any asbestos, PCB's, lead based paint, or other pollutants or hazardous materials, then the Contractor shall also provide evidence that Pollution Liability Insurance, including completed operations and Contractual Liability coverage of not less than limits of $5,000,000 has been procured and is in force on the project. However, if the Contractor demonstrates that coverage for claims arising out of the abatement, removal, cleanup or other handling of asbestos, PCB's, lead based paint, or other pollutants or hazardous materials is covered by the Contractor's general liability insurance, a separate Contractor's Pollution Liability Policy will not be required.
7. **Professional Liability:** If the Contractor is required to furnish professional services for the Project, the Contractor shall procure Professional Liability insurance covering the performance of the professional services, with policy limits of not less than $1,000,000 per claim and $2,000,000 in the aggregate unless otherwise required by the Owner.
8. **Additional Insured Requirements**: The University of Connecticut, the State of Connecticut, their respective officers, officials, agents, employees, boards and commissions shall be named as Additional Insureds under the coverages described in Paragraphs 2-6 of this Section B and that said coverage(s) is provided for all operations, uses, occupations, acts and activities of the insureds under the Contract Documents and under any amendments, modifications, extensions or renewals of said Contracts regardless of whether liability is attributable to the named insureds or a combination of the named insureds and the additional named insureds. Coverage shall be provided in the form of an endorsement to the Contractor's insurance policy or policies, which endorsement shall be at least as broad as ISO Form CG 20 37 04 13 and ISO Form CG 20 10 04 13.
9. If the Contractor is a joint venture or general partnership, the joint venture or general partnership and each individual member or partner of the joint venture or general partnership, as applicable, must be designated in each policy as named insureds.
10. A Certificate of Insurance shall clearly indicate the Project name, Project number or some easily identifiable reference to the relationship to the Owner.
11. Each liability policy shall contain a Cross Liability Endorsement and shall include a waiver of subrogation clause.
12. All insurance secured by Contractor or Subcontractors pursuant to the Owner's requirements under the provisions of this Section shall be in policies subject to the Owner's approval, as to form, content, limits of liability, cost and issuing companies. Such companies shall have and maintain an A.M. Best rating of not less than A-(VII), or otherwise acceptable to Owner.
13. If the Contractor maintains insurance against physical loss or damage to Contractor's construction equipment and tools, such insurance shall include an insurer's waiver of rights of subrogation in favor of Owner.

C. Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required under this Exhibit A shall contain a provision that coverages afforded under the policies will not be canceled, terminated or materially changed, altered or allowed to expire until at least thirty (30) days' prior written notice has been given to the Owner. If any of the foregoing insurance coverages are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 of the General Conditions and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section I.B of this Exhibit A. Information concerning

reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief and shall identify on their faces the project name and contract number to which they apply. The Certificate(s) of Insurance must also provide clear evidence that the Contractor's Insurance Policies contain at least the minimum limits of coverage and special provisions prescribed in this Exhibit A.

II. PROPERTY INSURANCE

A. Property insurance on an all-risk basis, including coverage for the perils of earthquakes and floods, has been purchased by the Owner. Insurance required by this Section is not intended to cover machinery, tools and equipment of the Contractor which is used in the performance of the Work, but is not incorporated into the permanent improvements, nor any materials and equipment paid for by the Owner and stored off-site, for which the Contractor shall procure property insurance satisfactory to the Owner. The Contractor shall, at is own expense, provide coverage for its machinery, tools and equipment subject to these provisions. Unless the Project is for new construction (rather than for renovations to an existing structure or facilities), the Owner's property insurance program shall provide for Builder's Risk insurance coverage for the Project.

B. **Builder's Risk Insurance:** If the Project is for new construction (rather than for renovations to an existing structure or facilities), the Contractor shall purchase and maintain Builder's Risk Insurance in the amount of the initial Contract Sum (or Guaranteed Maximum Price, as applicable) plus values of subsequent modifications or change orders on a replacement cost basis. The terms and conditions of such Builder's Risk insurance shall be satisfactory to the Owner in all respects. The Builder's Risk coverage shall be written on a Special Covered Cause of Loss form and shall include theft, vandalism, malicious mischief, collapse, temporary buildings, transit, debris removal, increased cost of construction, architect fees and expenses, soft costs, flood and earthquake. Builder's Risk shall include portions of Work located away from site but intended for use at the site. Contractor shall obtain consent of the insurance company and delete any provisions with regard to restrictions within any occupancy clause. Equipment break down coverage shall be included and shall cover insured equipment during installation and testing.

C. As regards Builder's Risk insurance maintained by the Contractor under Section II.B above, the Contractor shall be responsible for all costs not covered because of deductibles required under such insurance. As regards Builder's Risk insurance maintained by the Owner under Section II.A above, if such insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles provided the subject loss was caused by the acts or omissions of the Contractor, a Subcontractor or Sub-subcontractor or any other person or entity for whom or which any of them is responsible.

D. As regards partial occupancy or use by the Owner the Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

For Use with GC and CMR Contracts

EXHIBIT F
State of Connecticut Terms and Conditions

1. **STATUTORY AUTHORITY.** Statutory Authority. Connecticut General Statutes §§ 4a-52a, 10a-104, 10a-108, 10a-109d(a)(5) and/or 10a-151b, provide the University with authority to enter into contracts in the pursuit of its mission.

2. **NONDISCRIMINATION.** References in this section to "Contract" shall mean this Agreement and references to "Contractor" shall mean the Contractor.
(a) For purposes of this Section, the following terms are defined as follows: 1) "Commission" means the Commission on Human Rights and Opportunities; 2)"Contract" and "contract" include any extension or modification of the Contract or contract; 3) "Contractor" and "contractor" include any successors or assigns of the Contractor or contractor; 4) "Gender identity or expression" means a person's gender-related identity, appearance or behavior, whether or not that gender-related identity, appearance or behavior is different from that traditionally associated with the person's physiology or assigned sex at birth, which gender-related identity can be shown by providing evidence including, but not limited to, medical history, care or treatment of the gender-related identity, consistent and uniform assertion of the gender-related identity or any other evidence that the gender-related identity is sincerely held, part of a person's core identity or not being asserted for an improper purpose; 5)"good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations; 6)"good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements; 7) "marital status" means being single, married as recognized by the State of Connecticut, widowed, separated or divorced; 8) "mental disability" means one or more mental disorders, as defined in the most recent edition of the American Psychiatric Association's "Diagnostic and Statistical Manual of Mental Disorders", or a record of or regarding a person as having one or more such disorders; 9) "minority business enterprise" means any small contractor or supplier of materials fifty-one percent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise, and (3) who are members of a minority, as such term is defined in subsection (a) of Conn. Gen. Stat. § 32-9n; and 10) "public works contract" means any agreement between any individual, firm or corporation and the State or any political subdivision of the State other than a municipality for construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, or which is financed in whole or in part by the State, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees.

For purposes of this Section, the terms "Contract" and "contract" do not include a contract where each contractor is (1) a political subdivision of the state, including, but not limited to, a municipality, unless the contract is a municipal public works contract or quasi-public agency project contract, (2) any other state, including but not limited to any federally recognized Indian tribal governments, as defined in Conn. Gen. Stat. § 1-267, (3) the federal government, (4) a foreign government, or (5) an agency of a subdivision, state or government described in the immediately preceding enumerated items (1), (2), (3), or (4).

(b) (1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, status as a veteran, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the State of Connecticut; and the Contractor further agrees to take affirmative action to ensure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, status as a veteran, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by the Contractor that such disability prevents performance of the work involved; (2) the Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, to state that it is an "affirmative action equal opportunity employer" in accordance with regulations adopted by the Commission; (3) the Contractor agrees to provide each labor union or representative of workers with which the Contractor has a collective bargaining Agreement or other contract

or understanding and each vendor with which the Contractor has a contract or understanding, a notice to be provided by the Commission, advising the labor union or workers' representative of the Contractor's commitments under this section and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the Contractor agrees to comply with each provision of this Section and Conn. Gen. Stat. §§ 46a-68e and 46a-68f and with each regulation or relevant order issued by said Commission pursuant to Conn. Gen. Stat. §§ 46a-56, 46a-68e, 46a-68f and 46a-86; and (5) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this Section and Conn. Gen. Stat. § 46a-56. If the contract is a public works contract, municipal public works contract or contract for a quasi-public agency project, the Contractor agrees and warrants that he or she will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works or quasi-public agency projects.

(c) Determination of the Contractor's good faith efforts shall include, but shall not be limited to, the following factors: The Contractor's employment and subcontracting policies, patterns and practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

(d) The Contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission, of its good faith efforts.

(e) The Contractor shall include the provisions of subsection (b) of this Section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and in every subcontract entered into in order to fulfill any obligation of a municipal public works contract for a quasi-public agency project, and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Conn. Gen. Stat. § 46a-56 as amended; provided if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission regarding a State contract, the Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(f) The Contractor agrees to comply with the regulations referred to in this Section as they exist on the date of this Contract and as they may be adopted or amended from time to time during the term of this Contract and any amendments thereto.

(g) (1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or the State of Connecticut, and that employees are treated when employed without regard to their sexual orientation; (2) the Contractor agrees to provide each labor union or representative of workers with which such Contractor has a collective bargaining Agreement or other contract or understanding and each vendor with which such Contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the Contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (3) the Contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said Commission pursuant to Conn. Gen. Stat. § 46a-56; and (4) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor which relate to the provisions of this Section and Conn. Gen. Stat. § 46a-56.

(h) The Contractor shall include the provisions of the foregoing paragraph in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Conn. Gen. Stat. § 46a-56 as amended; provided, if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission regarding a State contract, the

Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

3. **STATE EXECUTIVE ORDERS**

This Contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill, promulgated June 16, 1971, concerning labor employment practices, Executive Order No. Seventeen of Governor Thomas J. Meskill, promulgated February 15, 1973, concerning the listing of employment openings and Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, concerning violence in the workplace, all of which are incorporated into and are made a part of the Contract as if they had been fully set forth in it. The Contract may also be subject to Executive Order No. 14 of Governor M. Jodi Rell, promulgated April 17, 2006, concerning procurement of cleaning products and services and to Executive Order No. 49 of Governor Dannel P. Malloy, promulgated May 22, 2015, mandating disclosure of certain gifts to public employees and contributions to certain candidates for office. If Executive Order 14 and/or Executive Order 49 are applicable, they are deemed to be incorporated into and are made a part of the Contract as if they had been fully set forth in it. At the Contractor's request, the Owner shall provide a copy of these orders to the Contractor.

4. **ETHICS AND COMPLIANCE**

Contractor acknowledges that by doing business with or seeking to do business with the State it is subject to certain provisions of the Code of Ethics for Public Officials of the State of Connecticut (the "Code of Ethics") applicable to current or prospective state contractors. Contractor acknowledges receipt and review of the "Guide to the Code of Ethics for Current or Potential State Contractors" as currently posted on the Web site of the Office of State Ethics www.ct.gov/ethics and agrees to comply with all provisions of the Code of Ethics applicable to Contractor as a current or potential state contractor. As required under Connecticut General Statutes §1-101qq, the Contractor will include the foregoing reference to the state ethics law summary in each subcontract entered into with Subcontractors in connection with the Project.

In accordance with the Owner's compliance program, the Owner has in place an anonymous ethics and compliance reporting hotline service – 1-888-685-2637. Any person who is aware of unethical practices, fraud, violation of state laws or regulations or other concerns relating to Owner policies and procedures can report such matters anonymously.

Such persons may also directly contact the Owner's compliance office at: Office of Audit, Compliance, and Ethics, 9 Walters Avenue, Unit 5084, Storrs, CT 06269-5084; Phone 860-486-4526; Fax 860-486-4527. As a provider of goods and/or services to the Owner, you are hereby required to notify your employees, as well as any subcontractors, who are involved in the implementation of this contract, of this reporting mechanism.

5. **CAMPAIGN CONTRIBUTION RESTRICTIONS**

For all State contracts as defined in section 9-612 of the Connecticut General Statutes 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 (SEEC Form 11):

SEEC FORM 11 CONNECTICUT STATE ELECTIONS ENFORCEMENT COMMISSION (Rev.7/18)

Notice to Executive Branch State Contractors and Prospective State Contractors of Campaign Contribution and Solicitation Limitations

This notice is provided under the authority of Connecticut General Statutes §9-612 (f) (2) and is for the purpose of informing state contractors and prospective state contractors of the following law (italicized words are defined on the reverse side of this page).

CAMPAIGN CONTRIBUTION AND SOLICITATION LIMITATIONS

No state contractor, prospective state contractor, principal of a state contractor or principal of a prospective state contractor, with regard to a state contract or state contract solicitation with or from a state agency in the executive branch or a quasi-public agency or a holder, or principal of a holder, of a valid prequalification certificate, shall make a contribution to (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of Governor, Lieutenant Governor, Attorney General, State Comptroller, Secretary of the State or State Treasurer, (ii) a political committee authorized to make

contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee (which includes town committees).

In addition, no holder or principal of a holder of a valid prequalification certificate, shall make a contribution to (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of State senator or State representative, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee.

On and after January 1, 2011, no state contractor, prospective state contractor, principal of a state contractor or principal of a prospective state contractor, with regard to a state contract or state contract solicitation with or from a state agency in the executive branch or a quasi- public agency or a holder, or principal of a holder of a valid prequalification certificate, shall knowingly solicit contributions from the state contractor's or prospective state contractor's employees or from a subcontractor or principals of the subcontractor on behalf of (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of Governor, Lieutenant Governor, Attorney General, State Comptroller, Secretary of the State or State Treasurer, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee.

DUTY TO INFORM

State contractors and prospective state contractors are required to inform their principals of the above prohibitions, as applicable, and the possible penalties and other consequences of any violation thereof.

PENALTIES FOR VIOLATIONS

Contributions or solicitations of contributions made in violation of the above prohibitions may result in the following civil and criminal penalties:

Civil penalties —Up to $2,000 or twice the amount of the prohibited contribution, whichever is greater, against a principal or a contractor. Any state contractor or prospective state contractor which fails to make reasonable efforts to comply with the provisions requiring notice to its principals of these prohibitions and the possible consequences of their violations may also be subject to civil penalties of up to $2,000 or twice the amount of the prohibited contributions made by their principals.

Criminal penalties —Any knowing and willful violation of the prohibition is a Class D felony, which may subject the violator to imprisonment of not more than 5 years, or not more than $5,000 in fines, or both.

CONTRACT CONSEQUENCES

In the case of a state contractor, contributions made or solicited in violation of the above prohibitions may result in the contract being voided.

In the case of a prospective state contractor, contributions made or solicited in violation of the above prohibitions shall result in the contract described in the state contract solicitation not being awarded to the prospective state contractor, unless the State Elections Enforcement Commission determines that mitigating circumstances exist concerning such violation.

The State shall not award any other state contract to anyone found in violation of the above prohibitions for a period of one year after the election for which such contribution is made or solicited, unless the State Elections Enforcement Commission determines that mitigating circumstances exist concerning such violation.

Additional information may be found on the website of the State Elections Enforcement Commission, www.ct. go v/ see c . Click on the link to "Lobbyist/Contractor Limitations."

DEFINITIONS

"State contractor" means a person, business entity or nonprofit organization that enters into a state contract. Such person, business entity or nonprofit organization shall be deemed to be a state contractor until December thirty-first of the year in which such contract terminates. "State contractor" does not include a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Prospective state contractor" means a person, business entity or nonprofit organization that (i) submits a response to a state contract

solicitation by the state, a state agency or a quasi-public agency, or a proposal in response to a request for proposals by the state, a state agency or a quasi-public agency, until the contract has been entered into, or (ii) holds a valid prequalification certificate issued by the Commissioner of Administrative Services under section 4a-100.

"Prospective state contractor" does not include a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Principal of a state contractor or prospective state contractor" means (i) any individual who is a member of the board of directors of, or has an ownership interest of five per cent or more in, a state contractor or prospective state contractor, which is a business entity, except for an individual who is a member of the board of directors of a nonprofit organization, (ii) an individual who is employed by a state contractor or prospective state contractor, which is a business entity, as president, treasurer or executive vice president, (iii) an individual who is the chief executive officer of a state contractor or prospective state contractor, which is not a business entity, or if a state contractor or prospective state contractor has no such officer, then the officer who duly possesses comparable powers and duties, (iv) an officer or an employee of any state contractor or prospective state contractor who has *managerial or discretionary responsibilities with respect to a state contract*, (v) the spouse or a *dependent child* who is eighteen years of age or older of an individual described in this subparagraph, or (vi) a political committee established or controlled by an individual described in this subparagraph or the business entity or nonprofit organization that is the state contractor or prospective state contractor.

"State contract" means an agreement or contract with the state or any state agency or any quasi-public agency, let through a procurement process or otherwise, having a value of fifty thousand dollars or more, or a combination or series of such agreements or contracts having a value of one hundred thousand dollars or more in a calendar year, for (i) the rendition of services, (ii) the furnishing of any goods, material, supplies, equipment or any items of any kind, (iii) the construction, alteration or repair of any public building or public work, (iv) the acquisition, sale or lease of any land or building, (v) a licensing arrangement, or (vi) a grant, loan or loan guarantee.

"State contract" does not include any agreement or contract with the state, any state agency or any quasi-public agency that is exclusively federally funded, an education loan, a loan to an individual for other than commercial purposes or any agreement or contract between the state or any state agency and the United States Department of the Navy or the United States Department of Defense.

"State contract solicitation" means a request by a state agency or quasi-public agency, in whatever form issued, including, but not limited to, an invitation to bid, request for proposals, request for information or request for quotes, inviting bids, quotes or other types of submittals, through a competitive procurement process or another process authorized by law waiving competitive procurement.

"Managerial or discretionary responsibilities with respect to a state contract" means having direct, extensive and substantive responsibilities with respect to the negotiation of the state contract and not peripheral, clerical or ministerial responsibilities.

"Dependent child" means a child residing in an individual's household who may legally be claimed as a dependent on the federal income tax of such individual.

"Solicit" means (A) requesting that a contribution be made, (B) participating in any fundraising activities for a candidate committee, exploratory committee, political committee or party committee, including, but not limited to, forwarding tickets to potential contributors, receiving contributions for transmission to any such committee, serving on the committee that is hosting a fundraising event, introducing the candidate or making other public remarks at a fundraising event, being honored or otherwise recognized at a fundraising event, or bundling contributions, (C) serving as chairperson, treasurer or deputy treasurer of any such committee, or (D) establishing a political committee for the sole purpose of soliciting or receiving contributions for any committee. Solicit does not include: (i) making a contribution that is otherwise permitted by Chapter 155 of the Connecticut General Statutes; (ii) informing any person of a position taken by a candidate for public office or a public official, (iii) notifying the person of any activities of, or contact information for, any candidate for public office, or (iv) serving as a member in any party committee or as an officer of such committee that is not otherwise prohibited in this section.

"Subcontractor" means any person, business entity or nonprofit organization that contracts to perform part or all of the obligations of a state contractor's state contract. Such person, business entity or nonprofit organization shall be deemed to be a subcontractor until December thirty first of the year in which the subcontract terminates. "Subcontractor" does not include (i) a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or (ii) an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Principal of a subcontractor" means (i) any individual who is a member of the board of directors of, or has an ownership interest of five per cent or more in, a subcontractor, which is a business entity, except for an individual who is a member of the board of directors of a nonprofit organization, (ii) an individual who is employed by a subcontractor, which is a business entity, as president, treasurer or executive vice president, (iii) an individual who is the chief executive officer of a subcontractor, which is not a business entity, or if a subcontractor has no such officer, then the officer who duly possesses comparable powers and duties, (iv) an officer or an employee of any subcontractor who has managerial or discretionary responsibilities with respect to a subcontract with a state contractor, (v) the spouse or a dependent child who is eighteen years of age or older of an individual described in this subparagraph, or (vi) a political committee established or controlled by an individual described in this subparagraph or the business entity or nonprofit organization that is the subcontractor.

6. WHISTLEBLOWING

This Contract is subject to the provisions of § 4-61dd of the Connecticut General Statutes. In accordance with this statute, if an officer, employee or appointing authority of the Contractor takes or threatens to take any personnel action against any employee of the Contractor in retaliation for such employee's disclosure of

information to any employee of the Contracting state or quasi-public agency or the Auditors of Public Accounts or the Attorney General under the provisions of subsection (a) of such statute, the Contractor shall be liable for a civil penalty of not more than five thousand dollars for each offense, up to a maximum of twenty per cent of the value of this Contract. Each violation shall be a separate and distinct offense and in the case of a continuing violation, each calendar day's continuance of the violation shall be deemed to be a separate and distinct offense. The Owner may request that the Attorney General bring a civil action in the Superior Court for the Judicial District of Hartford to seek imposition and recovery of such civil penalty. In accordance with subsection (f) of such statute, each large state Contractor, as defined in the statute, shall post a notice of the provisions of the statute relating to large state Contractors in a conspicuous place which is readily available for viewing by the employees of the Contractor.

7. **CODE OF CONDUCT**

In furtherance of its longstanding commitment to fundamental human rights, to the dignity of all people, and to the environment, the Owner has developed the Code of Conduct for University of Connecticut Vendors (the "Vendor Code of Conduct"). The Contractor hereby acknowledges receipt of the Vendor Code of Conduct. A copy of the Vendor Code of Conduct is available at http://csr.uconn.edu/. The Vendor Code of Conduct is hereby incorporated herein by reference to the extent the Contractor is required to comply with the same pursuant to this section.

The Contractor agrees to comply with the "Principal Expectations" described in the Vendor Code of Conduct. The Contractor further agrees to comply with the "Preferential Standards" described in the Vendor Code of Conduct, to the extent a commitment to so comply, or a representation of compliance, was provided by the Contractor to the Owner in writing. Any such commitment or representation is hereby incorporated herein by reference.

The Contractor agrees to provide the Owner with such evidence of Contractor's compliance with this section as the Owner reasonably requests and to, at the request of the Owner, provide a comprehensive, annual summary report of the Contractor's corporate social and environmental practices.

8. **BACKGROUND CHECKS**

The Contractor shall comply with all of the Owner's background screening requirements applicable to the Project (the "Screening Requirements"). If the Project is to take place on the UConn Health campus in Farmington, Connecticut, the Screening Requirements will be outlined in the Specifications for the Project. If the Project is located on any other campus of the Owner, the Screening Requirements will be outlined in the Bid Documents for the Project. The Contractor warrants that it will not assign any employee, independent contractor or agent to perform services under this Contract unless that employee, independent contractor or agent is cleared for work on the Project by the Contractor, in a manner consistent with the Screening Requirements, for performing such services. Without limiting the foregoing, the Contractor shall immediately remove any employee, independent contractor or agents performing services under this Contract on any campus of the Owner if it becomes known to the Contractor that such person may be a danger to the health or safety of the campus community, or at the request of the Owner based on a concern of community or individual safety.

Without limiting the obligations of the Contractor under §3.18 of the General Conditions, the Contractor shall defend, indemnify and hold harmless the state of Connecticut, the Owner, and all of their employees, agents and/or assigns for and against any claims, suits or proceedings resulting from the failure of the Contractor to comply with the Screening Requirements and/or that are caused in whole or in part by the actions or omissions of the Contractor, any Subcontractor, Sub-subcontractor, their respective employees, or any other person or entity for whom any of them is responsible.

AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

AIA A201-2017 FOR ON-CALL TRADE (FOR CONTRACTS OF $500,000 OR LESS)
Rev. 9-20-19

for the following PROJECT:
(Name and location or address)

THE OWNER:
(Name and address)

THE CONTRACTOR:
(*Name and address*)

THE ARCHITECT:
(Name and address)

TABLE OF ARTICLES

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

(Paragraphs deleted)

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the "Agreement") and consist of the Master Agreement (as defined in the Agreement), the Agreement, these General Conditions of the Contract for Construction (hereinafter the "General Conditions"), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties; (2) a Change Order; (3) a Construction Change Directive; or (4) a written order for a minor change in the Work issued by the Architect.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants; (2) between the Owner and a Subcontractor or a Sub-subcontractor; (3) between the Owner and the Architect or the Architect's consultants; or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means all of the construction and services required by, described in, reasonably inferable from, and as necessary to produce the results intended by the Contract Documents, whether completed or partially completed, and includes, without limitation, the furnishing of (1) all materials, supplies, equipment, fixtures, tools, implements, and other items and facilities required for, or in connection with, or for inclusion or incorporation into, the Project; and (2) all labor, supervision, transportation, utilities, storage and all other services required for or in connection with the Project, except as specifically indicated in the Contract Documents to be the responsibility of others. The Work may constitute the whole or a part of the Project, whether on or off the site of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part, and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§-1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

(Paragraphs deleted)

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials and Instruments of Service may be in paper or electronic form.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in Section 6.1 of the Agreement to render initial decisions on Claims in accordance with Section 15.2.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 Intent of the Contract Documents

The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 Severability

The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.1.2 Inconsistencies

In the event of inconsistencies within, among, or between parts of the Contract Documents or between the Contract Documents and applicable standards, codes, and ordinances, the Contractor shall: (1) provide the better quality or greater quantity of Work; or (2) comply with the more stringent requirement; either or both in accordance with the Owner's interpretation. The terms and conditions of this Section 1.2.1.2 however, shall not relieve the Contractor of any of the obligations set forth in Sections 3.2 and 3.7.

§ 1.2.1.2.1 Before ordering any materials or equipment or performing any Work, the Contractor shall verify the figures shown on the Drawings before laying out the Work and will be responsible for any errors or inaccuracies resulting from Contractor's failure to do so. In the event that the Contractor shall, while laying out the Work, become aware of: (1) any conflicts between (a) the Drawings, the Specifications or any Modification to the Drawings or the Specifications and (b) the actual layout of the Work, or (2) any conflicts or inconsistencies in the Drawings, the Specifications or any Modification to the Drawings or the Specifications themselves, Contractor shall promptly notify the Architect. If the Contractor proceeds without the Architect's clarification and instruction on the matter, the Contractor shall proceed at Contractor's own risk.

§ 1.2.1.2.2 If a minor change in the Work is found necessary to address actual field conditions, the Contractor shall submit detailed drawings to reflect such change for approval by the Architect before implementing such change in the Work.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

(Paragraphs deleted)

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications and other Instruments of Service

§ 1.5.1 The Owner will retain all common law, statutory and other reserved rights, including copyrights, in the

Instruments of Service as provided in the contract between the Owner and the Architect. Unless otherwise indicated in such contract, the Architect and the Architect's consultants shall be deemed the authors of their respective Instruments of Service. Upon completion of the Work, and at the request of the Architect, all copies of the Instruments of Service, except one record set that may be retained by the Contractor, shall be returned or suitably accounted for to the Architect. None of the Contractor, Subcontractor, Sub-subcontractor, or any material or equipment supplier shall own or claim a copyright in the Instruments of Service. The Instruments of Service and other documents prepared by the Architect and the Architect's consultants, and copies thereof furnished to the Contractor, are for use solely with respect to the Project. None of the Contractor, a Subcontractor, Sub-subcontractor, or any material or equipment suppliers may use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants appropriate to and for use in the execution of the Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 or notice of termination shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed (and also, in the case of a Notice of Claims by the Contractor to the Owner, to the Owner's designated representative and the Initial Decision Maker) by certified or registered mail, or by courier providing proof of delivery.

(Paragraphs deleted)

§ 1.7 Transmission of Data in Digital Form

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Contract or the Contract Documents.

§ 1.8 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties may use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.9 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 1.10 Provisions Required by Law Deemed Inserted

§ 1.10.1 Each and every provision of law and clause required by law to be inserted in this Contract shall be

deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. Except as otherwise provided in Section 4.2.1, the Architect does not have any authority to act on behalf of the Owner. The term "Owner" means the Owner or the Owner's designated representative.

§ 2.1.1.1 Pursuant to Section 8.2 of the Agreement, the Owner shall designate a representative through whom all communications by the Contractor with the Owner shall be made except as otherwise provided in the Contract Documents or instructed in writing by the Owner. If the Owner retains a third party (other than the Architect) to provide construction administration services, the Owner shall instruct the Contractor as to the role of such third party in the Project (including, without limitation, the extent to which the Contractor is to communicate directly with such third party) and the authority of such third party, if any, to act on behalf of the Owner.

§ 2.1.2 Not Used.

§ 2.2 Not Used.

(Paragraphs deleted)

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor whose status under the Contract Documents shall be that of the Architect.

(Paragraph deleted)

§ 2.3.4 To the extent such surveys are in the possession of the Owner and are required for the performance of the Work, the Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project. The Contractor shall exercise proper precautions relating to the safe performance of the Work. Contractor shall review such surveys and notify the Owner of any inaccuracies therein within fourteen (14) days of receipt.

§ 2.3.5 Data concerning the Project site, size of the Project site, access to the Project site, staging and storing, present obstructions on or near the Project site, conditions of existing adjacent structures, locations and depths of sewers, conduits or pipes, gas lines, position of sidewalks, curbs and pavements, and other data concerning site conditions to the extent provided by the Owner, has been obtained from sources Owner believes reliable. Accuracy of such data, however, is not guaranteed and is furnished solely for accommodation of Contractor. Use of such data is made at the Contractor's sole risk and expense.

(Paragraphs deleted)

§ 2.3.6 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.7 The Contractor shall be responsible for determining how many copies of the Drawings and other Contract Documents are necessary for the execution of the Work. The Contractor shall be responsible for the reproduction and distribution of such copies.

§ 2.4 Owner's Right to Stop the Work

If the Contractor (1) fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2; (2) repeatedly fails to carry out Work in accordance with the Contract Documents; or (3) creates a situation which the Owner believes, in its sole judgement, poses an imminent risk of loss to property or persons, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and (1) fails within a seven-day period after receipt of notice of such default or neglect from the Owner to commence and continue correction of such default or neglect with diligence and promptness, and (2) further fails to do so within three days after receipt of a second such notice from the Owner, the Owner shall be entitled to (but not obligated to), without prejudice to other rights and remedies Owner may have, correct the deficiencies in the Work. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the Owner's cost of correcting such deficiencies in the Work, including expenses and compensation payable to the Architect for additional services made necessary by Contractor's default, neglect or failure. The Contractor shall also be responsible for all of the Owner's other costs, damages, delays, and associated impacts arising from the Owner's exercise of its rights under this Section 2.5. If payments then or thereafter due the Contractor are not sufficient to cover amounts payable to the Owner under this Section 2.5, the Contractor shall pay the difference to the Owner.

§2.6 Extent of Owner Rights

§2.6.1 The rights stated in Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (1) granted in the Contract Documents, (2) at law or (3) in equity.

§2.6.2 In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures for safety precautions and programs in connection with the Work.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor has designated the representative set forth as Contractor's representative in Section 8.3 of the Agreement who has express authority to bind the Contractor with respect to all matters under this Contract. Any and all notices to be provided to the Contractor by the Owner or Architect under the Contract Documents shall be delivered to such Contractor's representative. The term "Contractor" means the Contractor or the Contractor's authorized representative. The Contractor shall not replace the Contractor's representative without ten days prior written notice and the prior written consent of the Owner.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect or the Owner in the administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.1.4 The Contractor represents and warrants the following to the Owner (in addition to the other representations and warranties contained in the Contract Documents) as an inducement to the Owner to execute

the Contract, which representations and warranties shall survive the execution and delivery of the Contract and the final completion of the Work:

.1 That it is financially solvent, able to pay its debts as they mature and possesses sufficient working capital to complete the Work and perform its obligations under the Contract Documents;

.2 That it, through its Subcontractors or otherwise, is able to furnish the tools, materials, supplies, equipment and labor required to complete the Work and perform its obligations hereunder and has sufficient experience and competence to do so;

.3 That it is authorized to do business in the State where the Project is located and properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over it and over the Work and the site of the Project;

.4 That its execution of the Contract and its performance thereunder have been duly authorized by all necessary corporate action; and

.5 That its duly authorized representative has visited the site of the Project, familiarized himself or herself with the local conditions under which the Work is to be performed and correlated his/her observations with the requirements of the Contract Documents.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 The Contractor shall, along with such Subcontractors as the Contractor deems necessary, visit the Project site prior to the execution of the Contract. The execution of the Contract by the Contractor is a representation that the Contractor and such Subcontractors have visited the Project site, become familiar with all existing conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 The Contractor may request permission from the Owner to conduct, at Contractor's sole cost and expense, tests, examinations and/or inspections as Contractor deems necessary to become sufficiently acquainted with existing conditions on the Project site. No such tests, examinations or inspections shall be conducted without the Owner's prior written approval and any engineer or consultant engaged by the Contractor or a Subcontractor to perform such test, examination or inspection shall be subject to the Owner's prior approval.

§ 3.2.3 Because the Contract Documents are complementary, the Contractor shall, before ordering any materials or starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect and Owner Representative any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect and the Owner may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. After reporting to the Architect any error, inconsistency, or omission in or among the Contract Documents which the Contractor discovers or which is made known to the Contractor, the Contractor shall not proceed with the subject Work without the Architect's written response and/or clarifications and, if required, Owner's approval of any associated adjustments to the Contract Documents.

§ 3.2.4 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect and the Owner any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.5 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, as would have been avoided if the Contractor had performed such obligations and the Contractor shall be responsible for associated delays and impacts. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities unless the Contractor should have but failed to recognize such error, inconsistency, omission or difference.

§ 3.2.6 No additional compensation or time will be granted to the Contractor by reason of conditions which the Contractor could have discovered or reasonably anticipated through the fulfillment of its obligations under this Section 3.2.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. The Contractor shall schedule and perform the Work so as not to interfere with the Owner's on-going business operations or any other work being performed by or on behalf of the Owner in or about the Project site. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for any claims against the Owner and any damages, losses, costs and expenses incurred by the Owner resulting or arising from the acts and omissions of the Contractor's employees, Subcontractors, Sub-subcontractors, material and equipment suppliers, and their respective agents and employees, and any other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any Subcontractors or Sub-subcontractors or material and equipment suppliers.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 The Contractor's qualified representative shall attend all periodic progress meetings which will be held at such time and at such place as the Architect or the Owner shall designate.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.2.1 Contractor's request for any substitution shall constitute a representation by the Contractor that:

.1 the Contractor and any Subcontractors and Sub-subcontractors impacted by such substitution have investigated the proposed substitute product and determined that it is equal or superior in all respects to the product specified;

.2 the Contractor and proposed manufacturer will provide the same or superior warranty coverage for the substitution that the Contractor would for the product specified;

.3 the cost data presented is complete and includes all related costs under this Contract, and Contractor waives all claims for additional costs related to the substitution which subsequently become apparent;

.4 Contractor shall coordinate the installation of the accepted substitution, making such changes as may be required for the Work to be complete in all respects;

.5 Contractor shall make requests for substitutions for Contractor's convenience within fourteen (14) days after Contract award or at the preconstruction meeting; and

.6 Contractor shall reimburse and compensate the Owner for any costs incurred in connection with, and/or the value of, any services performed by the Architect and/or the Owner associated with, addressing the request for substitution.

§ 3.4.3 All labor shall be performed by workmen skilled in their respective trades, and workmanship shall be of good quality so that first class work in accordance with the standards of construction set forth in the Contract Documents will be achieved. The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit the employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.3.1 The Contractor shall neither permit nor suffer the use of offensive language or lewd conduct by Contractor's employees or other persons carrying out the Work on or about the Project site. All of the Owner's buildings are smoke-free buildings. The Contractor shall not permit (1) smoking in the Owner's buildings, (2) outdoor smoking, where outdoor smoking could create a hazard, or (3) the introduction or use of drugs, spirituous or intoxicating liquors, on or about the Owner's property by the Contractor's employees or other persons carrying out the Work. The Contractor shall comply with the Owner's current "Policy on Discrimination Harassment and Related Interpersonal Violence" including its provisions prohibiting sexual harassment. The Contractor shall be fully responsible to the Owner for the acts and omissions of the Contractor's employees, Subcontractors, Sub-subcontractors and material and equipment suppliers, and all persons either directly or indirectly employed by any of them to perform any part of the Work.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements and any substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 The Contractor shall procure and assign to the Owner at the time of Substantial Completion of the Work any and all Subcontractor, Sub-subcontractor, manufacturer and supplier warranties relating to any materials or labor used in the Work. Such warranties shall supplement the warranties provided by the Contractor in Section 3.5.1. All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.5.3 Directions, specifications and recommendations by manufacturers for installation, handling, storing, adjustment, and operation of their materials or equipment shall be complied with, but the Contractor shall nonetheless have the responsibility of determining whether such directions, specifications, and

recommendations may safely and suitably be employed in the Work, and of notifying the Architect and Owner in advance in writing of any deviation or modification necessary for installation safety or proper operation of the item.

§ 3.6 Taxes

The Owner is a tax-exempt institution. The Contractor shall be familiar with the current regulations of the Department of Revenue Service. The tax on materials or supplies exempted by such regulations shall not be included as part of the Contract Sum, or any Application for Payment, or request for Change Order or other compensation. A Sales Tax Certificate for the duration of the Project is available from the Owner's Purchasing Department upon written request.

§ 3.7 Permits, Fees, Notices, and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with, be responsible for the performance of the Work in accordance with, and give notices required by all local, state and federal laws, statutes, ordinances, codes, building codes, rules, regulations, permits, and orders enacted, promulgated, issued or ordered by any governmental body or public or quasi-public authority having jurisdiction over the Work, the Contractor and/or the site of the Project. The foregoing requirements shall include, without limitation, those relating to equal opportunity, labor, wages, and employment.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules, and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

(Paragraphs deleted)

§ 3.7.4 If any governmental body having jurisdiction over the Work requires licenses or registrations for the performance of the Work, or any part thereof, the Contractor shall hold such valid licenses or registrations as may be required by law to prosecute the Work to completion. If any part of the Work for which such a license or registration is required to be performed by a Subcontractor or Sub-subcontractor, the Contractor shall ensure that any such subcontractor holds such valid licenses or registrations as may be required by law to prosecute said Work to completion.

§ 3.7.5 Concealed or Unknown Conditions. See Section 15.1.9 of these General Conditions.

§ 3.7.6 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances, except when installation is specified as part of the

allowance in Division 1 Specifications; and

.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1; and (2) changes in Contractor's costs under Section 3.8.2.2, except when installation is specified as part of the allowance in the General Requirements (Division 1 of the Specifications).

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent and Project Manager

§ 3.9.1 The Contractor shall employ a competent, experienced, full-time superintendent(s) and necessary assistants who shall be in attendance at the Project site during performance of the Work for the duration of the entire Project. The superintendent shall be satisfactory to the Owner and the Contractor shall not replace the superintendent without the prior written consent of the Owner. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 If not already identified as part of the Owner's pre-qualification process, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner and Architect the name, qualifications and references of the proposed superintendent(s).

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. If, for any reason, the Owner finds the superintendent(s) to be unsatisfactory, the Contractor will, within five (5) days after the request of Owner, replace such superintendent with a qualified individual to whom neither the Owner nor the Architect has objection. The Contractor shall not change the superintendent without the Owner's written consent, which shall not unreasonably be withheld or delayed.

§ 3.9.4 The Contractor shall employ a competent Project Manager and necessary assistants who shall be in attendance at the Project site during performance of the Work for the duration of the entire Project. The Project Manager shall be satisfactory to the Owner and the Contractor shall not replace the Project Manager without the prior written consent of the Owner. The Project Manager shall represent the Contractor and communications given to the Project Manager shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

§ 3.9.5 If not already identified as part of the Owner's pre-qualification process, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner and the Architect the name, qualifications, and references of the proposed Project Manager. The Contractor shall not employ a proposed Project Manager to whom the Owner or Architect has made reasonable and timely objection. If, for any reason the Owner finds a Project Manager to be unsatisfactory, the Contractor shall, upon the request of the Owner, replace such Project Manager with a qualified individual to whom neither the Owner nor the Architect has objection. The Contractor shall not replace the Project Manager without the prior written consent of the Owner.

§ 3.9.6 Additional key personnel may be required for the Project. The Contractor shall provide additional personnel as required to ensure proper project management and coordination.

§ 3.10 Contractor's Construction Schedule

§ 3.10.1 The Contractor shall, within ten (10) days after the execution of the Contract, submit for the Owner's approval and the Architect's information a construction schedule for the Work including such detail and information and in the form as described in Division 1 of the Specifications. The schedule shall include, without limitation, (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. Upon the

Owner's approval of the schedule, such approved schedule shall be deemed to supersede and replace the preliminary schedule attached as Exhibit D to the Agreement and such approved schedule shall constitute a Contract Document. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for simultaneous review and approval by the Owner and Architect. The Owner and Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule; and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

(Paragraph deleted)

§ 3.11 Documents and Samples at the Site

§ 3.11.1 The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy as required by the Owner, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.11.2 In addition, the Contractor shall indicate on the Drawings, as best as possible, all new and existing pipe and conduit runs which are concealed in the floor slabs, walls, ceilings, etc. The Contractor shall indicate on the Drawing the electrical distribution panel and circuit number supplying each item installed or reconnected, with diagrammatic lines showing sequence of connections. All changes shall be identified and circled on the Architect's and Engineer's drawings at the time they occur for each such field change.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect or Engineer without action. Such return without action will not be grounds for an increase in the Contract Time.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them; (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so; and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically notified and informed the Architect and the Owner of such deviation at the time of submittal and (1) the Owner has given written approval to the specific deviation as a minor change in the Work; or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to reasonably rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.12.11 See Specifications for additional information on Shop Drawings.

§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations at the Project site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract

Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 Nothing contained in the Contract Documents shall be interpreted as giving the Contractor exclusive use of the Project site.

§ 3.13.3 The performance of the Work shall not impede the Owner's normal, continuous, and safe use and operation of its roadways and buildings in and around the Project site. If it appears that the performance of the Work will impede such use and operation, the timing and manner of the performance of the Work shall be subject to the approval of the Owner.

§ 3.13.4 The Contractor shall comply with the following procedures when working in occupied areas including classrooms, hallways, and office spaces.

§ 3.13.4.1 The Contractor shall notify the Owner two (2) days prior to commencing Work in an occupied area. This notification shall include a detailed description of the Work to be performed in the occupied area.

§ 3.13.4.2 There shall be no overhead Work (e.g. demolition, HVAC ductwork, and/or electrical) performed directly over occupied areas.

§ 3.13.5 The Contractor shall produce a site logistics plan for the Owner's review and approval before beginning operations on the Project site. This document shall be updated and submitted to the Owner on a periodic basis as required by the Owner. No deviations from this plan will be allowed without the prior approval of the Owner.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.14.3 Unless authorized in writing by the Architect, structural elements of the Work shall not be cut, patched, or otherwise altered or repaired. Existing Work that is cut, damaged, disturbed or otherwise interfered with by the Contractor, a Subcontractor, Sub-subcontractor or anyone for whom any of them is responsible, shall be fully, properly, and carefully repaired by the responsible Contractor, Subcontractor or Sub-subcontractor. All such repairs shall be completed to the satisfaction of the Architect, and shall match similar existing adjoining work.

§ 3.14.4 See Specifications for additional information on Cutting and Patching.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area and roadways free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials and shall clean and/or remove all stains, spots, marks, blemishes, foreign matter and dirt from surfaces of the Work and from other surfaces not a part of the Work but where such conditions resulted from the Contractor's operations from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work
The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights
The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or patent or such infringement is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect. In the event of legal action arising out of such infringement for which the Contractor is responsible and which action has the effect of stopping the Work, the Owner may require the Contractor to substitute other products of like kind as will make it possible to pursue and complete the Work. Costs and expenses caused thereby shall be borne by the Contractor.

§ 3.18 Indemnification
§ 3.18.1 To the fullest extent permitted by law the Contractor shall defend, indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the willful, wanton or negligent acts or omissions of the Contractor, a Subcontractor, Sub-subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18. Nothing in this Section shall be construed as obligating the Contractor to indemnify or hold harmless any of the parties indemnified hereunder against liability for damage arising out of bodily injury to persons or damage to property caused by or resulting from the negligence of any such indemnified party, or such party's agents or employees.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, Sub-subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor, a Subcontractor or Sub-subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

§ 3.18.3 Additional Indemnification Obligations
§ 3.18.3.1 The Contractor shall defend, indemnify and hold harmless the Owner, the Architect, and the Architect's consultants and their agents and employees from and against all claims, damages, losses, including, but not limited to, attorneys' fees, arising out of or resulting from any type of pollution and/or environmental impairment into or upon the land, the atmosphere, or any course or body of water that is above or below ground, which is caused by any negligent or willful or wanton act or omission of the Contractor, Subcontractors, Sub-subcontractors or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

§ 3.18.3.2 The Contractor shall defend, indemnify and hold harmless the Owner, the Architect, and the Architect's consultants, and the agents and employees of any of them from and against all claims, damages, losses, including, but not limited to, attorneys' fees, arising out of or resulting from any acts of Contractor, Subcontractors, Sub-subcontractors or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable that are outside of the Contract Specifications, and without the

supervision or direction of the Owner, its Architects and Engineers.

§ 3.18.3.3 The Contractor shall defend, indemnify and hold harmless the Owner, the Architect, and the Architect's consultants, and the agents and employees of any of them from and against all claims, damages, losses, and expenses including, but not limited to, attorneys' fees, arising out of or resulting from the misuse or malfunction of any equipment rented, owned, or leased by the Contractor, any Subcontractor, Sub-subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts they may be liable.

§ 3.18.3.4 Nothing in Section 3.18.3 shall be construed as obligating the Contractor to indemnify or hold harmless any of the parties indemnified hereunder against liability for damage arising out of bodily injury to persons or damage to property caused by or resulting from the negligence of any such indemnified party, or such party's agents or employees.

§ 3.18.3.5 The Owner assumes no responsibility or liability from loss or damage to the Contractor's equipment, materials, or supplies.

§ 3.19 The Contractor shall obtain and maintain at its expense such general liability insurance coverage as will insure its indemnification obligations under Section 3.18 and any other contractual indemnity obligations assumed by the Contractor under the Contract Documents.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that such portion of the Work is, and when the Work is fully completed the entirety of the Work will be, in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.2.1 Where it is stated in the Contract Documents that the Contractor shall pay for or reimburse the Owner for services of the Architect, such payment shall be at a rate of two and one half (2.5) times the Architect's Direct Personnel Expense plus any expenses incurred in providing such services. Direct Personnel Expense is defined as the direct salaries of the Architect's personnel engaged on the Project and the portion of the cost of their mandatory and customary contributions and benefits related thereto, such as employment taxes and other statutory employee benefits, insurance, sick leave, holidays, vacations, pensions, and similar contribution and benefits.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from

the Contract Documents; (2) known deviations from the most recent construction schedule submitted by the Contractor; and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 Each of the Owner and the Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Owner or the Architect considers it necessary or advisable for implementation of the intent of the Contract Documents, the Owner or the Architect, as applicable, will have authority to require additional inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not such Work is fabricated, installed or completed. The Architect shall advise and assist the Owner in performing any of the functions set forth in this Section that are performed by the Owner.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Owner or the Architect will prepare Change Orders and Construction Change Directives and may order minor changes in the Work as provided in Section 7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion of the Work; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10. The undertaking of inspections by the Architect is not to be construed as supervision of construction activities nor an assumption by the Architect of any responsibility for job site safety for the performance of Work.

§ 4.2.10 Not Used.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon provided that, if not agreed otherwise, the

Architect shall respond to such requests within fifteen (15) days after Architect's receipt of such request. If such written request is made of the Architect, and the Owner or the Contractor disagrees with the Architect's response to such request, the matter shall be submitted to the Initial Decision Maker pursuant to Article 15.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The decision of the Owner, in consultation with the Architect, on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon provided that, unless agreed otherwise, the Architect shall respond to such requests within fifteen days after Architect's receipt of such request. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site and, unless otherwise expressly indicated, refers to subcontractors of all tiers performing any part of the Work (other than Subcontractors). The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable, but in no event more than ten days after the Owner's execution of the Contract (or such shorter period of time as required by applicable law), shall notify the Owner and Architect of the names, addresses, Connecticut Tax Registration numbers, and Federal Employer Identification numbers (or social security numbers as to individuals) of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within fourteen days of receipt of the information, the Architect or Owner may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity; or (2) requires additional time for review. Failure of the Architect or Owner to provide notice within the fourteen-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection.

§ 5.2.2.1 The Contractor shall not contract with a person or entity who appears on the State of Connecticut Debarment List, the Federal Davis Bacon Act Debarment List, both of which are available through:

http://www.ctdol.state.ct.us/

or the Federal List of Excluded Parties Listing System available through http://epls.arnet.gov/

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work and is not ineligible to be

contracted with in accordance with Section 5.2.2.1, the Contract Sum shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity (including those who are to furnish materials or equipment fabricated to a special design) for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

(Paragraphs deleted)
§ 5.2.5 If requested by the Owner, the Contractor shall provide to the Owner copies of all subcontracts and supply agreements entered into by the Contractor for the Work.

§ 5.2.6 The Contractor shall comply with its obligations under Connecticut General Statutes §4b-93 and §4b-96 including, without limitation and as applicable, its obligation to contract with those Subcontractors identified in the Contractor's bid for the Project to perform the (1) masonry, (2) electrical, (3) plumbing, and (4) heating, ventilating and air conditioning (HVAC) components of the Work and to timely provide copies to the Owner of the executed subcontracts in accordance with the requirements of Connecticut General Statutes §4b-96.

§ 5.2.7 All subcontracts shall comply with the requirements of Connecticut General Statutes §4b-96 and shall be in the form provided by the Owner. The Contractor may supplement the terms and conditions set forth in the Owner supplied form of subcontract by attachment of additional terms and conditions thereto provided such supplemental terms and conditions are not inconsistent or in conflict with the requirements of CGS §4b-96. In the event of any such conflict or inconsistency, the provisions of the form of subcontract set forth in CGS §4b-96 shall prevail and control.

§ 5.3 Subcontractual Relations
§ 5.3.1 By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts
§ 5.4.1 Each subcontract for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner pursuant to Article 14 and only for those subcontracts that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract, the Owner assumes the Contractor's rights and obligations under the subcontract but only to the extent arising subsequent to the effective date of the assignment and related to Work not yet performed. Contractor agrees to execute any and all other documents

reasonably required to effect the assignment.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than sixty (60) days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity.

§ 5.4.4 The Contractor shall promptly, but in any event not later than ten (10) days after obtaining knowledge thereof, advise the Owner in writing of any claim or demand by a Subcontractor claiming that any amount is due to such Subcontractor or claiming any default by the Contractor in any of its obligations to such Subcontractor.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor contract.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules and construction requirements as requested by the Owner. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement between the Owner and Contractor. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under these General Conditions, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent. If the performance of any part of a Contractor's Work depends on proper and timely execution or relies upon the interphasing or coordinating of the work of any Separate Contractor or the Owner, the Contractor shall allow for this interrelationship in the planning and performance of the Contractor's Work, without interference with the work of any Separate Contractor or the Owner.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction (collectively and individually, "Interference"). The Owner shall have the right to off-set such costs against any amounts owed to the Contractor by the Owner to the extent related to the Project. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's Interference but only as regards Interference by Separate Contractors whose work was not identified in the Contract Documents as work to be performed by Separate Contractors.

§ 6.2.4 The Contractor shall promptly remedy the damage that the Contractor wrongfully causes to completed or partially completed construction or to the property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§6.2.6 Upon the Owner's request, the Contractor shall defend any proceedings brought against the Owner by any Separate Contractor on account of any damage alleged to have been caused by the Contractor which arises from the Contractor's failure to comply with the terms and conditions of this Section 6.2.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Owner will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect. A Construction Change Directive is a directive by the Owner that may or may not be agreed to by the Contractor. All changes to the Work shall be approved by the Owner. Except as permitted in Section 7.3, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that the Owner has been unjustly enriched by any alterations or additions to the Work, whether or not there is, in fact, any unjust enrichment, shall be the basis for any claim for an increase in the Contract Sum, an extension of the Contract Time, or a change in any time period provided for in the Contract Documents.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Owner or Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

There shall be no extension in the Contract Time unless the Contractor can effectively demonstrate that the Work delayed is on the critical path of the approved construction schedule as provided in Division 1 of the Specifications and in Section 8.3 of these General Conditions.

The signature of the Architect on the Change Order signifies that the Architect has reviewed the proposed Change Order, with accompanied breakdowns and subcontractor's change proposals, for appropriate quantities and unit costs and recommends approval of the proposed Change Order. The Architect's signature is not necessary in order for the Change Order to constitute a modification to the Contract which binds the Owner and the Contractor if the Contractor and the Owner have both signed the Change Order.

§ 7.2.2 Change Order Cost Components
The Contractor's proposal for a Change Order shall be itemized completely, submitted in a detailed format acceptable to the Owner, and shall include the following itemized cost components, as applicable:

§ 7.2.2.1 Engineered Equipment and Materials:
Costs for Engineered Equipment and Materials included in any Change Order shall be considered all-inclusive of the purchase cost thereof including all freight costs, purchasing services, expediting, and inspections and shall be substantiated by manufacturer and supplier quotes subject to review and approval by the Owner. Engineered Equipment shall be defined as equipment to be incorporated into and become a permanent part of the completed installation specified in the Contract Documents. Materials shall be defined as construction materials that become incorporated into and become a permanent part of the completed installation.

§ 7.2.2.2 Direct Field Labor Hours:
Direct labor work hours included in any Change Order shall be itemized indicating the direct labor hours to be expended in the actual installation of Engineered Equipment and Materials. The quantity of hours shall be based upon the Contractor's estimate to complete the subject Work based upon actual field conditions and shall be subject to review and approval by the Owner.

§ 7.2.2.3 Direct Field Labor Costs:
Direct field labor costs are defined as the costs of the direct labor required for the actual installation of Engineered Equipment and Materials. Direct field labor costs shall be based on the Contractor's direct field labor rates, which rates are subject to review and approval by the Owner and which rates shall be substantiated by a detailed direct labor cost breakdown with associated back-up support in a form acceptable to the Owner. The Contractor's direct field labor rates may include hourly labor classifications for foremen, journeymen, apprentices, laborers, etc. Direct field labor rates may include the Contractor's direct labor payroll costs including social security, unemployment (federal and state), workers' compensation insurance, fringe benefits, and any other identified costs directly related to direct labor.

If the Project is subject to prevailing wage rates, no wage rate above the prevailing rate shall be allowed unless such wage rate is substantiated by documentation of actual wages paid in accordance with such wage rate except in the case where the Contractor's wage rates were submitted to and accepted by the Owner as a condition of the Contract.

§ 7.2.2.4 Construction Equipment and Tool Rental:
Costs associated with Contractor owned or rented construction equipment and major tools used in the performance of the Work may be included as part of the cost of a Change Order if it is demonstrated to the Owner's satisfaction that such costs are valid and related to the change in the Work which is the subject of the Change Order. Major tools shall be defined as non-hand-held tools. Pricing rates for construction equipment and major tools shall be subject to Owner's review and approval. Costs for specialized construction equipment not already on site shall be shown separately and shall require justification by the Contractor.

§ 7.2.2.5 Field Overheads (Indirects):
Field overhead (indirect) labor shall mean and include field (onsite) supervision (general foremen, field engineers). Costs for field overhead (indirect) labor shall be based on hourly rates which are subject to review and approval by the Owner. Such costs shall be allowed as part of the cost of a Change Order if it is demonstrated to the Owner's satisfaction that such costs are valid and arise as a direct result of the change in the Work which is the subject of the Change Order. All such costs shall be substantiated by supporting data submitted for review and approval by the Owner. Costs for specialized personnel or additional staff shall be shown separately and shall require justification by the Contractor.

Field Facilities shall mean and include the following:

1. Temporary offices (including office furniture, copiers, computers, printers, other office equipment, and supplies);
2. Temporary material storage (storage vans and containers, warehouse rental); and
3. Utilities (electricity, phones, data lines, restroom facilities).

Costs for Field Facilities, which are subject to the review and approval of the Owner, may only be included as part of the costs of a Change Order if (1) the Change Order includes an extension of the Contract Time which has been approved by the Owner in accordance with Section 8.3; or (2) the Contractor otherwise demonstrates to the Owner's satisfaction that such costs are valid and arise as a direct result of the change in Work which is the subject of the Change Order.

§ 7.2.2.6 As noted in Section 3.6, the Owner is a tax-exempt institution. The tax on materials or supplies exempted by the current regulations of the Department of Revenue Services shall not be included as a cost component of any Change Order or Change Order request/proposal.

§ 7.2.2.7 Subcontractors

Subcontractors shall adhere to the same contract requirements and shall utilize change order pricing methodology that is consistent with the Contract. The Contractor shall provide detailed Subcontractor cost proposals to substantiate all subcontractor pricing.

§ 7.2.2.8 General and Administrative Overhead (Home Office) Costs and Profit (Overhead and Profit)

Overhead and Profit shall cover the following:

1. All home office expenses;
2. Safety related items, including safety equipment, safety administration, and all related costs associated with the contractor's safety program;
3. Small tools, which are defined as construction tools with a value of up to $500;
4. Consumable materials, which are normally used in the execution of the Work and as may be further defined in the general conditions section of the Specifications;
5. Indirect costs as related to field administrative personnel (project manager, field safety supervisor, planners, estimators, office manager, secretarial services, document control);
6. Indirect costs as related to support staff;
7. Commercial General, Automobile, Umbrella, Aircraft and Contractor's Pollution Liability Insurance as described in Section 11.1.1;
8. Parking;
9. Safety;
10. Commissioning Requirements;
11. Such other items as are commonly considered part of home office overhead;
12. Company vehicles, gas, mileage and travel time;
13. Union-related contributions and expenses;
14. Any training; and
15. Licenses.

§ 7.2.2.9 The amount to be included in a Change Order for Overhead and Profit shall be based on and limited to the markup percentages identified in the table below as applied to the total net increase in the direct costs of the Work which arises as a direct result of the change in the Work which is the subject of the Change Order.

Contractor/Subcontractor Combined Overhead and Profit Markup Table:	
Contractor markup on self-performed work	15%
Contractor markup on Subcontractor work.	5%
Subcontractor markup on self-performed work.	15%
Subcontractor markup on Work performed by Sub-subcontractors under contract with a Subcontractor.	5%

Markup on Work that is self-performed by a Sub-subcontractor under contract with a Subcontractor.	10%
Subcontractor markup on Sub-subcontractor work	0%
Sub-subcontractor markup on Work performed by lower tier Sub-subcontractors	0%

§ 7.2.2.10 Notwithstanding the foregoing, the aggregate markup for Overhead and Profit included in any Change Order shall not exceed twenty percent (20%) of the total net increase in the direct costs of the Work which arises as a direct result of the change in the Work which is the subject of the Change Order.

§ 7.2.2.11 Overtime, when specifically authorized by the Owner and not as an Extraordinary Measure (as defined in Section 8.2.3.2), shall be paid for by the Owner on the basis of premium payment only, plus the cost of insurance and taxes based on the premium payment period.

§ 7.2.2.12 For a change in the Work resulting in a net decrease in the direct cost of the Work, the Change Order will reflect a reduction in the Contract Sum of an amount equal to such net decrease as confirmed by the Owner. In the case where there are both increases and decreases in direct costs of the Work, Overhead and Profit included in the Change Order shall be figured on the basis of the net increase in costs, if any, with respect to that change.

§ 7.2.2.14 Bond Costs: Actual additional bond premiums assessed to the Contractor by the surety issuing the payment and performance bonds for the Project as a direct result of an increase in the Contract Sum reflected in the subject Change Order may be included as part of the costs of the Change Order only when supported by written documentation from the surety confirming that the Change Order requires an increase to the original payment and performance bonds. Any reimbursement of additional bond premiums to which Contractor would be entitled shall be addressed in a final Change Order with no additional fee or mark-up thereon.

§ 7.2.3 The Contractor shall submit proposals for Change Orders on the "Change Order Proposal Request Form" provided in Division 1 of the Specifications or on a form and in a format otherwise acceptable to the Owner. In order to facilitate the Owner's review of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials, unit prices, and Subcontracts. Subcontractor proposals shall be submitted in support of the Contractor's Change Order proposal and shall be similarly itemized.

§ 7.2.4 Alternates awarded by Change Order after Contract execution are not subject to Contractor, Subcontractor or Sub-subcontractor mark-up for Overhead and Profit.

§ 7.2.5 Agreement upon and execution of any Change Order shall constitute a final settlement of all matters relating to the change in the Work which is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the Contract Time. In the event a Change Order increases the Contract Sum, Contractor shall include the Work covered by such Change Order in Applications for Payment as if such Work were originally part of the Contract Documents.

§ 7.2.6 Any percentage referred to hereafter for General Conditions, and/or Overhead and Profit included in the adjustment to the Contract Sum shall be applied to the costs of performing the Work attributable to the change as stated in 7.3.4.1 through 7.3.4.5. No markup shall be allowed for premiums on bonds and insurance.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Owner or Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly. The

signature of the Architect signifies that he has reviewed and recommends the change. However, if the Owner has signed the Change Directive the Architect's signature is not necessary in order for the Change Directive to be valid.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for a proposed adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee;

.4 Time and materials subject to a not to exceed a stipulated price; or

.5 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method for adjustment in the Contract Sum shall be determined in the sole discretion of the Owner, on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable amount for overhead and profit in accordance with, and not to exceed the limitations set forth in, Section 7.2. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs of performing the Work for the purposes of this Section 7.3.4 shall be limited to the following as described in Section 7.2:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies and equipment, including the cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools and any hand-held equipment, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds, permit fees, and sales, use or similar taxes directly related to the change; and

.5 Costs of field overhead personnel directly attributable to the change based on supporting data.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Owner of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. The Contractor must proceed promptly regardless if the directive is signed by the Contractor.

§ 7.3.8 Not Used.

§ 7.3.9 Not Used.

§ 7.3.10 When the Owner and Contractor agree concerning the adjustments in the Contract Sum and/or Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 If the Contractor does not expeditiously proceed with the Work to be performed under a Construction Change Directive (regardless of whether or not such Work is in dispute), the Owner may, in its sole discretion, cause such Work to be performed by others, and deduct the actual costs incurred by the Owner in connection with such reassigned Work from the Contract Sum.

§ 7.4 Minor Changes in the Work

The Architect may, subject to approval of the Owner, order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Contractor shall carry out such written orders promptly.

The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and Owner and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect and Owner that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, the Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Notice to Proceed.

§ 8.1.3 The date of Substantial Completion is the date Substantial Completion is achieved in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Contract, the Contractor confirms that the Contract Time is a reasonable period for performing the Work and that the Contractor is capable of completing the Work in accordance with the Contract Documents within the Contract Time.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work or any operations on the Project site prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion of the Work within the Contract Time.

(Paragraph deleted)

§ 8.2.3.1 The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. The construction schedule shall be updated to reflect actual conditions (sometimes referred to as progress reports) as set forth in Section 3.10.1 of these General Conditions or as otherwise requested by the Owner. In the event any progress report indicates any delays or potential delays, the Contractor shall advise the Owner of its plan to recover the schedule, providing the Owner with a recovery schedule, and shall further take all steps necessary to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report or recovery schedule constitute an adjustment in the Contract Time or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to Change Order.

§ 8.2.3.2 In the event the Owner determines that the performance of the Work has not progressed or reached the

level of completion required by the approved construction schedule for reasons within the responsibility of the Contractor, the Owner shall have the right to order the Contractor to take any and all corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime; (2) supplying additional manpower, equipment, and facilities; and (3) other similar measure (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measure shall continue until the progress of the Work complies with the stage of completion required by the approved construction schedule. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

§ 8.2.3.3 The Contractor shall not be entitled to any adjustment in the Contract Price in connection with Extraordinary Measures required by the Owner if the Owner determines that the conditions creating the need for such Extraordinary Measures were within the responsibility of the Contractor.

§ 8.2.3.4 The Owner may exercise the rights furnished the Owner under or pursuant to this Section as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any approved construction schedule or completion date established in accordance with the Contract Documents.

§ 8.2.4 Not Used.

§ 8.2.5 Except in the event of an emergency, no substantial field operations shall be performed outside of regular working hours without the prior approval of the Owner. The Contractor shall not be entitled to additional compensation for work performed outside of regular working hours. For the purposes of this Contract "regular working hours" shall mean and include the hours of 7:00 a.m. to 3:00 p.m. unless otherwise provided in the Contract Documents.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; or (3) by labor disputes, fire, or unavoidable casualties beyond the Contractor's control, then the Contract Time may be extended by Change Order for such reasonable time periods as demonstrated through a Critical Path Analysis as described in and in conformance with Division 1 of the Specifications and accepted by the Owner.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.2.1 Claims of delay and requests for extensions of time shall set forth in detail the circumstances of such claim, the dates upon which the claimed delay began and ended, and the number of days' extension of time requested. The Contractor shall provide supporting documentation as the Architect and Owner may require, including a revised Construction Schedule indicating the effect of the circumstances which form the basis for the claim.

§ 8.3.2.2 The Contractor shall not be entitled to an extension of time for each and every one of a number of causes which have a concurrent and interrelated effect on the progress of the Work.

§ 8.3.2.3 Claims for extensions of time arising out of authorized changes in the Work shall be made in writing prior to or concurrent with the submission of the Contractor's proposal for such changes. No extension of time arising out of changes in the Work will be granted after the date upon which the Contractor is authorized to proceed with such changes unless specific provision for an extension of time has been incorporated in the Owner's authorization to proceed.

§ 8.3.2.4 No Damage for Delay. Notwithstanding anything to the contrary set forth in the Contract Documents, the Owner shall not be liable to the Contractor for Claims or damages of any nature caused by or arising out of delays. The sole remedy against the Owner for delays shall be the allowance of additional time for completion of the Work, the amount of which shall be subject to the procedures set forth in the Contract Documents. Except to the extent, if any, expressly prohibited by law, the Contractor expressly agrees not to

make and hereby waives any Claim for damages for any delay, including, but not limited to, those resulting from increased labor or material costs; directions given or not given by the Owner or Architect, including scheduling and coordination of the Work; the Architect's preparation of drawings and specifications or review of shop drawings and requests for instruction(s); or, on account of any delay, obstruction or hindrance for any cause whatsoever by the Owner, Owner, Architect, or any Separate Contractor, whether or not foreseeable or anticipated. The Contractor agrees that its sole right and remedy therefore shall be an extension of the Contract Time, if appropriate.

§ 8.3.2.5 It is expressly understood that, notwithstanding anything to the contrary set forth in the Contract Documents, no Subcontractor or Sub-subcontractor shall be entitled to make any Claim for additional compensation, costs or damages against the Contractor (nor may the Contractor assert against Owner such Claims as pass-through claims of Subcontractor or otherwise) for delay. Unless agreed by Owner in writing, Contractor shall include in every Subcontract a 'No-Damage-For-Delay' provision in a form approved by the Owner.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by the Owner under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under and in accordance with the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

§ 9.2.1 The Contractor shall submit a schedule of values to the Architect and Owner, as provided in Section 9.2.1.1 below, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, as the Owner may require. This schedule, unless objected to by the Architect or Owner, shall be used as a basis for reviewing the Contractor's Applications for Payment for the Work. Any changes to the schedule of values shall be submitted to the Architect and Owner and supported by such data to substantiate its accuracy as the Architect or Owner may require, and, unless objected to by the Architect or Owner, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.2.1.1 The Contractor shall submit its proposed schedule of values to the Owner and the Architect for review and approval before the earlier of (i) thirty (30) days after the execution of the Contract; and (ii) the submission by the Contractor of its first Application for Payment for the Work.

§ 9.2.1.2 The final schedule of values for the Work shall be submitted (typewritten) on an AIA Document G702 form and shall be broken down into a minimum of sixteen (16) divisions based on the Construction Specifications Institute (CSI) Guidelines and subdivided further by Materials and Labor.

§ 9.3 Applications for Payment

§ 9.3.1 By the twenty-fifth day of each month, the Contractor shall submit to the Owner and the Architect a draft Application for Payment for Work performed through the end of such month in the form of an AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet. The latest edition issued by the AIA of each such document must be used.

The Owner and the Architect will within ten (10) days after receipt of the Contractor's draft Application for Payment notify the Contractor in writing of all necessary revisions.

The Contractor shall make all revisions to the Application for Payment as required by the Owner.

The Contractor shall then submit to the Owner and the Architect an Application for Payment for Work in the form of a notarized AIA Document G702, Application for Payment, supported by AIA Document G703, Continuation Sheet, free of any handwritten, marks, notes, annotations, etc. and an Affidavit of Payment and Release of Claims form (either partial release or final release as appropriate) in a form as provided by the Owner.

By submission of the Affidavit and the Application for Payment the Contractor certifies that, to the best of the Contractor's knowledge, information and belief, the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that the current payment requested and shown therein is now due.

§ 9.3.1.1 Each payment requisition submitted by the Contractor 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 subcontract. 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 subsection, "pending construction change order" or "other pending change directive", means an authorized directive for extra work that has been issued to the Contractor or a Subcontractor.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material or equipment supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.1.3 Applications for Payment shall deduct, from the amount claimed due, the retainage and any other amounts to be withheld pursuant to Section 5.1.6 of the Agreement. The Contractor shall be prohibited from withholding more than the retainage withheld by the Owner pursuant to the Agreement from any payment which is otherwise due to any Subcontractor.

§ 9.3.1.4 Pursuant to the requirements of §4b-93 of the Connecticut General Statutes, whenever the Owner has designated a separate section for a class of work, the Contractor shall, when applicable, state as part of its application for partial payment that it considers the work required to be done under any such separate section to be fully completed in accordance with the terms of the Contract. The Owner shall thereupon conduct an inspection of the work in such class, and if it finds that such work has been fully completed in accordance with the terms of the Contract, it shall issue a statement certifying that such work is accepted as fully completed, and shall pay the Contractor in full for such work.

§ 9.3.2 Unless otherwise specifically approved in advance by the Owner, the Owner will pay only for materials and equipment delivered and incorporated in the Work as required by the Contract Documents. If approved in advance by the Owner, payment may be similarly made for materials and equipment suitably stored on site or off site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.2.1 Payment for stored material or equipment either on site or off site will require Owner's prior approval. Approval will be dependent upon Contractor's demonstration of hardship due to extended time duration between required purchase and actual field installation or the critical nature of the commodity in relation to the critical path of the construction schedule. Additionally, the Contractor must provide secured storage, insurance coverage for the material or equipment during storage, transfer of ownership of the material or equipment to the Owner and the Contractor shall indemnify the Owner for all costs associated with any delay and the costs associated with or resulting from, the loss or damage of such material or equipment during such storage. Payment for such stored material or equipment will be limited to 80% of invoice verified cost to the Contractor. No payment will be considered for raw materials. Those items requiring fabrication must be

complete so that identification and appropriate documentation can be obtained to ensure such items are part of the Work.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment, all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, Sub-subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

(Paragraph deleted)

§ 9.3.4 If payment for stored materials or equipment is approved, Contractor shall furnish with its Application for Payment which includes such stored materials or equipment a vendor invoice establishing the value of the material or equipment stored along with a statement of the amount to be paid to the vendor therefore.

§ 9.3.4.1 Approval of payment for stored materials or equipment is subject to inspection by Architect and Owner of such stored materials or equipment.

§ 9.3.4.2 The Contractor shall give the Owner Certificates of Insurance in accordance with the Contract Documents covering the full value of the items stored. Such insurance shall be maintained until the items are incorporated in the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect, following consultation with the Owner, may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. The Architect, following consultation with the Owner, may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of:

.1 defective Work not remedied;
.2 third party claims filed or reasonable evidence indicating probable filing of such claims unless full bond coverage, insurance or security acceptable to the Owner is provided by or demonstrated by the Contractor;
.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment in accordance with the provisions of this Contract;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 injury to persons or damage to the Work or property of the Owner, or a Separate Contractor, or others caused by the act of neglect of the Contractor or any Subcontractors or Sub-subcontractors;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance of the Contract Sum would not be adequate to cover actual or liquidated damages for the anticipated delay;
.7 repeated failure to carry out the Work in accordance with the Contract Documents;
.8 failure to submit Construction Schedules as outlined in Division 1 of the Specifications in the time prescribed;
.9 failure to submit all documents necessary for compliance with CHRO requirements;
.10 failure to submit copies of all certified payrolls;
.11 failure to provide copies of Subcontracts as required by statute and as otherwise requested by the Owner;
.12 failure to submit any other documentation requested by the Owner necessary for compliance with the requirements of any regulatory agency;
.13 amounts previously paid to the Contractor in excess of amounts properly due the Contractor; or
.14 failure of the Contractor to comply with any of the Contractor's indemnification obligations under the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld. The Owner shall not be deemed in default by reason of withholding payment while any of the above grounds remain uncured, nor shall any interest accrue or be payable with respect to any payments so withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.5.5 The Owner shall have the right to apply any such amounts so withheld in such manner, as the Owner may deem proper to satisfy such claims or to secure such protection. Such application of such amounts shall constitute payments to the Contractor.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has certified an Application for Payment, the Owner shall make payment of the certified amount in the manner and within the time provided in the Contract Documents or shall so notify the Contractor of the Owner's intent to withhold payment to the extent reasonably necessary to protect the Owner from loss for which the Contractor is responsible, including, loss resulting from acts or omissions of Subcontractors due to causes set forth in Section 9.5.1.

§ 9.6.2 The Contractor shall pay any amounts due a Subcontractor or supplier, whether for labor performed or materials furnished, not later than seven (7) days after the date the Contractor receives payment from the Owner which encompasses labor performed or materials furnished by such Subcontractor or supplier. Retainage withheld by the Contractor from such payments shall not exceed amounts actually retained from

payments to the Contractor on account of the Subcontractor's or supplier's portion of the Work. The Contractor shall include in all of its Subcontracts with its Subcontractors and suppliers a requirement that the Subcontractors and suppliers pay any amounts due any Sub-subcontractors or suppliers no later than seven (7) days after the Subcontractor or supplier receives a payment from the Contractor which encompasses labor performed or materials furnished by such sub-subcontractor or supplier.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers the amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Pursuant to Connecticut General Statutes Sections 10a-109a through 10a-109y:

.1 No payments shall be made by the Owner on account of this Contract for the Project until the bills or estimates presented for such payments shall have been duly certified to be correct by the Owner;

.2 The obligations of the Owner or the State of Connecticut to make payments to the Contractor for services, labor, or materials provided on the Project are limited to those amounts set forth in the Contract Documents and any agreed upon changes or amendments thereto. Neither the Owner nor the State of Connecticut shall or may be liable to make payments in excess of such amount.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor, Sub-subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment in accordance with the requirements of the Contract Documents, through no fault of the Contractor, within seven (7) days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven (7) days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven (7) additional days' notice to the Owner and Architect be entitled to the applicable statutory interest. Said provision does not apply where the Owner has submitted to the Contractor its intention to withhold payment in accordance with Section 9.6.1 or where the Architect has submitted to the Contractor its intention to withhold certification in accordance with Section 9.5.1.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize, without impact or interruptions the Work for its intended use.

The Work shall be considered to be "Substantially Complete(d)" or to have reached "Substantial Completion" on the date as determined by the Architect when (1) the entirety of the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can utilize the Work for the use for which it is intended (subject only items on the Punch List, the completion of which can be accomplished within thirty (30) days without interfering with the actual use of the Work by the Owner or those claiming by, through or under the Owner); (2) the Contractor has obtained a temporary or permanent certificate of occupancy for the Work permitting the lawful occupancy of the entire Project and any other permits, approvals, licenses, and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial occupancy thereof; and (3) the Architect has issued a Certificate of Substantial Completion for the entirety of the Work pursuant to Section 9.8.4 of these General Conditions and the Owner has issued written approval of the Certificate of Substantial Completion.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is Substantially Complete (with the exception of the issuance of the Architect's Certificate of Substantial Completion and the Owner's approval thereof), the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment (the "Punchlist"). Failure to include an item on the Punchlist does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's Punchlist, the Architect will make an inspection to determine whether the Work or designated portion thereof is Substantially Complete (with the exception of the issuance of the Architect's Certificate of Substantial Completion and the Owner's approval thereof). If the Architect's inspection discloses any item, whether or not included on the Contractor's Punchlist, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is Substantially Complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the Punchlist accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. The Certificate of Substantial Completion shall become valid upon the written approval thereof by the Owner.

§ 9.8.6 Certifications. The Contractor at completion of construction shall provide to the Owner a "Certificate of Substantial Compliance" bearing original signatures of an officer of the company stating: "This is to CERTIFY that, in my professional opinion the complete structure/renovations described above is in substantial compliance with the approved construction documents on file with the Owner. Minor deviations and special stipulations are noted below (if any)".

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is Substantially Complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall

prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by the decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or the portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied; (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least thirty (30) days' prior written notice has been given to the Owner; (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents; (4) consent of surety, if any, to final payment; (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties;, (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner; (7) all documents necessary for compliance with CHRO requirements and as required to obtain the written statement of release from CHRO referenced in Section 5.1.6.2.6 of the Agreement; (8) copies of all certified payrolls, (9) Contractor's certification that none of the material installed contains asbestos; (10) the Certificate of Substantial Compliance referenced in Section 9.8.6; and (11) any other documentation requested by the Owner necessary for compliance with the requirements of any regulatory agency. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall promptly pay to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor, any Subcontractor, Sub-subcontractor or any other party for whom any of them is responsible, or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor, the written approval of the Owner and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of

Claims.

§ 9.10.4
(Paragraphs deleted)
Not Used.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

§ 10.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. Prior to and as a condition of mobilization on site, the Contractor shall submit a Safety Plan to Owner. To the extent the Owner provides safety manuals or other information, any such manuals and information shall be deemed minimum requirements for the Contractor's fulfillment of its safety obligations. Safety fines may be assessed based on Owner's safety plan and or Occupational Safety and Health Administration ("OSHA").

§10.1.1.1 Prior to the commencement of the Work, the Contractor shall submit proof to the Owner of compliance with the requirements of Connecticut General Statutes §31-53b.

§10.1.1.2 The Contractor shall remove all snow and ice as may be required for the proper protection and/or prosecution of the Work. The Contractor shall coordinate and cooperate with the Owner for such activities.

§ 10.1.2 Contractor's Safety Program: The Contractor hereby acknowledges that the job site safety will be of utmost importance. Contractor shall be responsible for initiating, maintaining and supervising safety and anti-substance abuse precautions and programs in connection with the Work. Contractor shall provide all protection to prevent injury to all persons involved in any way in the Work and all other persons, including, without limitation, the employees, agents, guests, visitors, invitees and licensees of the Owner who may visit or be affected thereby. These precautions shall include, but in no event be limited to: (1) those set forth in the most current provisions of the Owner's Contractor Environmental Health and Safety Manual, which is incorporated by reference as a Contract Document; (2) the posting of danger signs and personal notification to all affected persons of the existence of a hazard of whatever nature; (3) the furnishing and maintaining of necessary traffic control barricades and flagger services; (4) the use, storage, removal and disposal of required explosives or other hazardous materials only under the supervision of qualified personnel and after first obtaining permission of all applicable governmental authorities; (5) and the maintenance of adequate quantities of both hose and operable fire extinguishers at the job site. The Contractor shall set forth in writing its own safety and anti-substance abuse precautions and programs in connection with the Work and if requested by the Owner submit the same to the Owner or its designee for review. The Owner may but shall not be obligated to make suggestions and recommendations to the Contractor with respect thereto.

.1 **Compliance of Work, Equipment and Procedures with all Laws**: All Work, whether performed by the Contractor, Subcontractors or Sub-subcontractors, or anyone directly or indirectly employed by any of them, and all equipment, appliances, machinery, materials, tools and like items incorporated or used in the Work, shall be in compliance with and conform to: (a) all applicable laws, ordinances, rules, regulations and orders of any public, quasi-public or other governmental bodies relating to the safety of persons and their protection against injury, specifically including, but in no event limited to the Federal Occupational Safety and Health Act of 1970, as amended and all rules and regulations now or hereafter in effect pursuant to said Act and the OSH Act of the State of Connecticut, as amended and all rules and regulations now or hereafter in effect pursuant to said Act; and (b) all rules, regulations and requirements of the Owner and its insurance carriers relating thereto. In the event of conflicting provisions, the more stringent shall govern.

.2 **Contractor's Designation of Safety Program Administrator**: The Contractor shall designate a qualified member of its organization at the job site in accordance with the requirements of the

Owner's Contractor Environmental Health and Safety Manual, whose duties shall include enforcement of the Contractor's Safety Program to assure compliance with Article 10 and to prevent accidents. This position may be required to be a full-time position dedicated to this Project. This person's name, qualifications and the estimated number of man-hours of effort per week performing this function shall be submitted to the Owner in writing. His or her identity, qualifications and level of effort must be satisfactory to the Owner who shall have the sole discretion to approve or reject the same. Any reduction to this schedule must be submitted to the Owner for approval. The Contractor shall further cause each Subcontractor and Sub-subcontractor to designate a qualified safety representative to assist the Contractor's safety representative in the performance of his or her duties as described above and the names of such representative shall be given to the Owner.

.3 **Suspension of Contractor's Work**: If in the opinion of the Owner or its designee the Contractor shall fail to provide a safe area for the performance of the Work or any portion thereof, the Owner or its designee shall have the right (but not the obligation) to suspend Work in the unsafe area. Contractor shall be liable for all costs incurred of any nature (including without limitation overtime pay, liquidated damages or other costs resulting from delays) resulting from the suspension.

.4 **Right of Owner to have Contractor Send Worker Home**: The Contractor shall provide to each worker on the job site the proper safety equipment for the duties being performed by that worker and will not permit any worker on the job site who fails or refuses to use the same. The Owner shall have the right but not the obligation to order the Contractor to cause any worker to be sent home for the day or to otherwise temporarily or permanently remove him or her from the job site for his or her failure to comply with safe practices or anti-substance abuse policies. Contractor shall promptly comply with such orders from the Owner and shall be liable for any and all costs of whatsoever nature, including attorney's fees paid or incurred by the Owner.

§ 10.1.3 Protection of Work and Property; Responsibility for Loss The Contractor shall, throughout its performance of the Work, maintain adequate and continuous protection of all property of the Owner and third parties and of the Work and temporary facilities against loss or damage from whatever cause arising out of the performance of the Work and shall comply with the requirements of the Owner and its insurance carriers and with all applicable laws, codes, rules and regulations with respect to the prevention of loss or damage to property as a result of fire or other hazards.

§ 10.1.4 Emergencies In any emergency affecting the safety of persons or property, or in the event of a claimed violation of any federal or state safety or health law or regulation arising out of or in any way connected with the Work or its performance, the Contractor shall act immediately to prevent threatened damage, injury, or loss or to remedy said violation whichever is applicable, failing which the Owner or its designee may immediately take whatever action it deems necessary including, but not limited to, suspending the Work.

The Owner may offset any and all cost or expenses of whatever nature including attorneys' fees paid or incurred by the Owner in taking such action against any sums then or thereafter due to the Contractor. The Contractor shall defend, indemnify, and hold the Owner, and its officers, agents, employees, harmless against any and all costs, expenses or liability in accordance with Section 3.18. If the Contractor shall be entitled to any additional compensation or extension of time claimed on account of emergency work not due to the fault or neglect of the Contractor, Subcontractors or Sub-subcontractors, it shall be handled as a request for a Change Order as provided in Section 7.2 of this Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for the safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 Employees performing any part of the Work and other persons who may be affected thereby;

.2 The Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 Other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements,

roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

The Contractor shall provide and pay for whatever security measures the Contractor deems necessary to protect the Work until acceptance by the Owner and the date of Substantial Completion of the Work established pursuant to Section 9.8.4.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on the safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 At a minimum, the Contractor shall implement, erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities of the safeguards. Additionally, the Contractor shall maintain all passageways, guard fences, lights and other facilities for protection. The Contractor shall also be responsible for all measures necessary to protect any property adjacent to the Project and improvements thereon. Any damage to such property or improvements shall be promptly repaired by the Contractor at its sole cost and expense.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for the execution of the Work, the Contractor, at a minimum, shall exercise utmost care and carry on such activities under the supervision of properly qualified personnel. When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary, the Contractor shall give the Owner advance written notice of at least five (5) days prior to bringing to the site or utilizing such explosives, materials, equipment or methods.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 and indemnify and save the Owner harmless for all damage or injury to referenced persons and property caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable in whole or in part to the fault or negligence of the Contractor a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.5.1 The Contractor shall repair or replace any such damage at no additional cost to the Owner. Such repair or replacement shall be completed within one week of the damage or as otherwise directed by the Owner. If the Contractor fails or refuses to repair the damage promptly, the Owner may have the repair or replacement performed and charge the cost to the Contractor by way of offset or direct payment as elected by the Owner.

§ 10.2.6 Not Used

§ 10.2.7 The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger the safety of persons or property or cause damage or create an unsafe condition.

(Paragraphs deleted)

§ 10.2.8 All materials furnished and all Work installed shall comply with the rules and recommendations of the National Board of Fire Underwriters; with all applicable State and local codes, laws, ordinances, rules and regulations; with all requirements of local utility companies and with the recommendations of the Insurance Rating Organization having jurisdiction.

§ 10.2.9 All apparatus, equipment and construction such as ladders, scaffolds, chutes, etc. shall comply with the

recommendations of the manual of Accident Prevention in Construction published by the Associated General Contractors of America.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents, including but not limited to the Owner's Contractor Environmental Health and Safety Manual, regarding any material, substance, chemical, waste, product, derivative, compound, mixture, solid, liquid, mineral or gas, whether naturally occurring or manmade, that is hazardous, toxic, or words of similar import or regulatory effect, and any petroleum or petroleum-derived products, radon, radioactive materials or wastes, asbestos in any form, lead or lead-containing materials, urea formaldehyde foam insulation, polychlorinated biphenyls and any other regulated materials identified by the U.S. Environmental Protection Agency (EPA), the U.S. Occupational Health and Safety Administration (OSHA), the U.S. Department of Transportation (DOT) and/or the Nuclear Regulatory Commission (collectively, "Hazardous Materials"). If the Contractor believes its Work will disturb or otherwise implicate any actual or suspected Hazardous Material or encounters a Hazardous Material not addressed in the Contract Documents, the Contractor shall not disturb any such Hazardous Material, immediately report the condition to the Owner and the Architect in writing and take all necessary precautions to prevent release of and exposure to the Hazardous Materials and foreseeable bodily injury or death to persons resulting from such Hazardous Material. If such reasonable precautions will be inadequate to prevent the release of and exposure to Hazardous Materials, or foreseeable bodily injury and death, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area.

§ 10.3.1.1 Upon request, the Owner will provide the Contractor with a written copy of the Hazard Communication Program and chemical inventory for areas in which the Work will be performed. The Owner, upon request, will make available to the Contractor an opportunity to review the Material Safety Data Sheets ("MSDS") on file for areas where hazardous chemicals are used and stored and in areas in which the Work will be performed.

§ 10.3.2 Upon receipt of the Contractor's notice, pursuant to Section 10.3.1 the Owner shall obtain the services of a qualified consultant to assess the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless or otherwise abated. Upon written request, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform the assessments for the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the Hazardous Material or substance has been rendered harmless or otherwise abated, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately (provided the Contractor has demonstrated to the Owner's satisfaction that delay to address the Hazardous Material impacted the critical path of the construction schedule) and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 Not Used.

§ 10.3.4 In no event shall the Owner have any responsibility for any substance or material that is brought to the Project site by the Contractor, any Subcontractor, Sub-subcontractor, any materialman or supplier or any entity for whom any of them is responsible. The Contractor agrees not to use any fills or other materials to be incorporated into the Work, which are hazardous, toxic or comprised of any items that are hazardous or toxic. In the event it is determined that materials that are hazardous, toxic or comprised of items that are hazardous or toxic have been used as fills or incorporated into the Work, the Contractor, at its sole expense, shall be responsible for immediate removal, proper disposal, and replacement of materials for the Work and surrounding areas so affected.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles; or

(2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

(Paragraphs deleted)

§ 10.4 Emergencies

In an emergency affecting the safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7. The Contractor shall promptly notify insurers, as applicable, the Architect and the Owner of the nature of the emergency. Immediately thereafter, the Contractor shall submit to the Architect and the Owner a written report including a description of the circumstances of the emergency and details of actions taken.

§ 10.5 Lockout/Tagout Procedures Required by OSHA

§ 10.5.1 The Contractor shall abide by all OSHA and Owner regulations and procedures pertaining to lockout and tagout of machines or equipment to prevent injuries by ensuring that hazardous forms of energy are isolated. This includes electrical, mechanical, hydraulic, pneumatic, chemical, thermal and other energy sources.

§ 10.7 Confined Space Entry

§ 10.7.1 The Contractor shall abide by all OSHA and Owner regulations and procedures required to implement a confined space entry permit program.

§ 10.8 Excavation and Trenching

§ 10.8.1 Any Work carried out under this Contract that will require excavation or trenching shall be carried out in accordance with all applicable Federal, State and Local rules and regulations, including OSHA regulations, and the Owner's applicable policies and procedures included in the Contract Documents.

§ 10.8.3 At a minimum, the Contractor shall comply with the Owner's Contractor Environmental Health and Safety Manual, which is available for review upon request and constitutes a Contract Document.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described below, in the Agreement and, as applicable, elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, the State of Connecticut and their respective officers, officials, agents, employees, boards and commissions shall be named as additional insureds as provided in the Agreement and as otherwise required by the Contract Documents.

§ 11.1.2 The Contractor shall furnish to the Owner, and deliver at the time of the execution of the Contract, Performance and Labor and Material Payment Bonds (each, a "Bond" and collectively, the "Bonds") pursuant to and in compliance with the requirements of Connecticut General Statutes §49-41,et seq. and the requirements of this Section 11.1. In all cases where the Contract Sum exceeds $100,000, the Contractor shall furnish the Bonds, each of which shall be in compliance with the form which has been adopted by the Owner as its required form of payment or performance bond, as applicable . The Bonds shall be provided by a Surety company licensed to do business in the State of Connecticut, that is acceptable to the Owner, and that is named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in the "Treasury Department Circular 570". The Surety company's underwriting limitation, as further set forth in "Treasury Department Circular 570", must not be less than the Contract Sum. The amount of each Bond shall be equal to the Contract Sum. The Bonds shall name the Owner as "Obligee".

§ 11.1.3 In addition to the foregoing, each of the Bonds shall contain the following language: "In the event that the surety assumes the contract or obtains a bid or bids for completion of the Contract, the surety shall ensure that the contractor chosen to complete the Contract is prequalified pursuant to Section 4a-100 of the Connecticut General Statutes in the requisite classification and has the aggregate work capacity rating and

single project limit necessary to complete the contract".

§ 11.1.4 Upon the request of any person or entity appearing to be a potential beneficiary of the Bond covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of such Bond or shall authorize a copy to be furnished.

(Paragraphs deleted)

§ 11.1.5 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days after the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage. In the event of suspension by the Owner due to the Contractor's failure to maintain the required insurance, the Contractor shall be responsible for, and shall not receive an extension of the Contract Time in connection with, the delay in the Work arising from the suspension.

§ 11.2 Not Used.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors (if any) subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 Not Used.

(Paragraphs deleted)

§ 11.4 Not Used.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner and made payable to the Owner for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and, by appropriate agreements, the Architect and Contractor shall make payments to their consultants and Subcontractors in a similar manner.

§ 11.5.2 Not Used.

§ 11.5.3 If the Contractor or any of its Subcontractors is a non-resident contractor, the Contractor and/or subcontractor shall comply with the requirements of Connecticut General Statutes Section 12-430(7) (the "Statute"), to the extent applicable. If the Contractor is a verified contractor as defined in the Statute, the Contractor shall provide to the Owner written verification of that status from the State Commissioner of Revenue Services. If the Contractor is an unverified contractor as defined in the Statute, the Contractor shall provide to the Owner proof that the Contractor has posted with the Commissioner of Revenue Services a surety bond in an amount equal to five percent (5%) of the Contract Sum and which is otherwise in compliance with

the requirements of the Statute.

§ 11.4.3 If the Contractor proposes to utilize a Subcontractor Default Insurance program in lieu of requiring Subcontractors to provide surety bonds for the Project, the Contractor must demonstrate actual cost savings to the Owner of no less than 18% between the cost of such program and the cost of traditional Subcontractor surety bonds.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without a change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Owner has not specifically requested to examine prior to its being covered, the Owner may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction shall be at the Contractor's expense and the Contractor shall not be entitled to an adjustment of the Contract Time.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Owner or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing inspections, uncovering and replacement, and compensation for the Architect's and Owner services made necessary thereby, shall be at the Contractor's expense.

If prior to the date of Substantial Completion, the Contractor, a Subcontractor, a Sub-subcontractor or anyone for whom any of them is responsible uses or damages any portion of the Work, including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment, or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5 and extended warranties required by the Contract Documents, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.8.4, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly at Contractor's sole expense after receipt of notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor by the end of such one-year period and, thereafter, give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor. If the Contractor fails to correct nonconforming Work within a reasonable time after receipt of notice from the Owner or Architect not to exceed thirty (30) days, the Owner may correct it in accordance with Section 2.5 or take such other commercially reasonable measures to recompense the Owner for its expenses, losses and damages arising from such nonconforming work.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to modify the Contractor's obligations under Section 3.5 of these General Conditions or to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be construed in accordance with and governed by the laws of the State of Connecticut without regard to its principles of conflicts of laws.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without the consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections and approvals of portions of the Work shall be made at an appropriate time as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities having jurisdiction. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and

inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense. If the inspections and tests conducted under Section 13.4.1 or this Section 13.4.2 reveal a failure in a portion of the Work, the Owner may order the inspection and testing at the Contractor's expense of any and all portions of the Work that are identical or similar to the failing portion.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's and Owner services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest Not Used.
(Paragraph deleted)

§ 13.6 Compliance with Owner Policies and Guidelines

At a minimum, the Contractor shall comply with established Owner policies and guidelines, which have been previously provided to bidders and/or are available for review upon request. These policies are hereby incorporated by reference herein, including but not limited to: Policies on Lockout/Tagout; Confined Space Entry as referenced in the Contractor's Environmental Health and Safety Manual; Code of Conduct; Sexual Harassment; Racism and Acts of Intolerance; Smoking.

§ 13.7 Preference in Employment

§ 13.7.1 In the employment of labor to perform the work specified herein, preference shall be given to citizens of the United States, who are, and continuously for three months prior to the date hereof have been residents of the labor market areas, as established by the Labor Commissioner in which said work is to be done; and if no such qualified persons are available, then to citizens who have continuously resided in the county in which the work is to be performed for at least three months prior to the date hereof and then to citizens of the State who have continuously resided in the State at least three months prior to the date hereof. In no event shall said provisions be deemed to abrogate or supersede in any manner any provision regarding residence requirements contained in a Collective Bargaining Agreement to which the Contractor is a party.

§ 13.8 Minimum Wage Rates

§ 13.8.1 If the Project involves new construction of a building or other structure or improvement and the total cost of all Work to be performed by Contractors and Subcontractors is $1,000,000 or more or if the Project involves remodeling, refurbishing, rehabilitation, alteration or repair of a building or other structure or improvement and such total cost is $100,000 or more then:

.1 The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee welfare fund, as defined in

subsection (i) of Section 31-53 of the Connecticut General Statutes , shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day.

§ 13.8.2 The State of Connecticut Labor Department Wage Schedule ("Wage Schedule") has been provided to the Contractor (where required) and the Contractor acknowledges receipt the Wage Schedule and agrees to accept the current prevailing wage scale as well as any annual adjustment to the prevailing wage scale as provided by the Connecticut Department of Labor. Wage Rates will be posted each July 1st on the Department of Labor's website: www.ctdol.state.ct.us. No such prevailing wage adjustment will be considered a basis for an amendment to this Contract. The Wage Schedule is deemed to reflect customary or prevailing wages for the Project and is hereby incorporated and made a part of the Contract Documents. Wage Rates shall be paid pursuant to Sections 31-53 and 31-54 of the Connecticut General Statutes and any regulations issued thereunder.

§ 13.9 Hours of Labor Permitted

§ 13.9.1 Pursuant to Section 31-57 of the Connecticut General Statutes, as applicable, no person shall be employed to work or be permitted to work more than eight hours in any day or more than forty hours in any week on any work provided for in the Contract. The operation of such limitation of hours of work may be suspended during an emergency upon the approval of the Owner.

§ 13.10 Examining and Copying Contractor's Records

§ 13.10.1 The Contractor shall permit the Owner or its duly authorized representative to examine and copy books and records of the Contractor relative to charges for extra work, alleged breaches of contract, settlement of claims, or any other matter involving the Contractor's demand for added compensation from the Owner. The Contractor shall also permit such examination and copying of its records as the Owner may deem necessary, excepting papers and records preceding the execution of the Contract that are not a matter of record with the Owner, in order to determine that the Contractor has complied with all laws and regulations pertaining to the Contract, such as but not limited to Labor Compliance, Affirmative Action Program and Equal Employment Opportunity.

§ 13.10.2 The Contractor further agrees that he shall keep all records relating to this Contract until the expiration of six (6) years after final payment under this Contract is made, or six (6) months after settlement of any disputes whichever may be later.

§ 13.10.3 The Contractor further agrees that Contractor and all Subcontractors shall permit the Owner, at its own expense, by its duly authorized representatives, to inspect and audit all their data, records and files pertaining to this Contract.

§ 13.11 System Layout Drawing

§ 13.11.1 System layouts indicated on the drawings are generally diagrammatic and locations and arrangements of items are approximate. Exact routing of conduit, wiring, location of fixtures, outlets, panels, piping, valves and all other equipment shall be governed by the structural conditions and obstructions. The entire layout shall be followed as closely as possible and the right is reserved by the Owner to reasonably change the locations to accommodate any conditions which may arise during the progress of the Work without additional compensation to the Contractor.

§ 13.12 Guaranty of Performance

§ 13.12.1 If the Contractor has submitted the financial statement of a parent or other affiliated entity in its Proposers Qualification Statement, or if pre-qualified, its application for pre-qualification and has also indicated in that submission that such parent or affiliate will guarantee the performance of the Contract, then the parent or affiliate shall execute, simultaneously, with the Contractor's execution of the Contract, a Guaranty in a form provided by and acceptable to the Owner.

§ 13.13 JOINT VENTURE

§ 13.13.1 If the Contractor is a joint venture, each joint venture partner shall be jointly, severally and individually responsible to the Owner for the performance of any and all obligations of the Contractor encompassed by the Contract Documents and as otherwise required by applicable law, and each joint venture partner shall be jointly, severally and individually liable to the Owner for any failures to perform such obligations in accordance with the Contract and such applicable law. In its dealings with the Owner, each joint venture partner shall have full authority to act in behalf of and bind the joint venture and any other joint venture partner. Each joint venture partner shall be considered to be the agent of the joint venture and of any other joint venture partner.

§13.14 Worker Geographic Distribution

§13.14.1 If the Project is a Covered Project (as defined hereinafter), the Contractor shall comply with the provisions of this Section 13.14.

§13.14.2 The Contractor shall submit to the Owner a plan for encouraging the hiring of Workers (as defined hereinafter) with Residence (as defined hereinafter) in the State of Connecticut.

§13.14.3 Following the close of each Quarter (as defined hereinafter), the Contractor shall submit a Worker Geographic Distribution Report (as defined hereinafter) to the Owner in a form satisfactory to the Owner. The "Worker Geographic Distribution Report" is a report that shall provide the following information for each Worker paid, during the most recently closed Quarter, for Work performed on the Project:

.1 The numbers of hours of Work for which such Worker was paid during such Quarter.
.2 The Wages (as defined hereinafter) paid to such Worker during such Quarter.
.3 The Residence of such Worker as of the close of such Quarter.

§13.14.4 The Worker Geographic Distribution Report shall not contain any personally identifiable information about a Worker.

§13.14.5 The following terms shall have the meaning assigned below for the purposes of this Section 13.14.

.1 "Covered Project" is a project that is both subject to Section 31-53(a) of the Connecticut General Statutes and for which the Contract Sum is $1,000,000 or greater.
.2 "Quarter" means a calendar quarter of each calendar year.
.3 "Residence" is the state and town in which a Worker resides, as reflected in the payroll records of such Worker's employer.
.4 "Subcontractor" is any subcontractor or sub-subcontractor of the Contractor, which subcontractor or sub-subcontractor employs Workers on the Project.
.5 "Wages" are the wages that are subject to Section 31-53(a) of the Connecticut General Statutes (including any amounts paid to an employee welfare fund).
.6 "Worker" is an employee of the Contractor or a Subcontractor (as defined hereinabove), which employee is performing Work on the Project and whose wages for such Work is subject to Section 31-53(a) of the Connecticut General Statutes.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of sixty (60) consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped; or
.2 An act of government, such as a declaration of national emergency that requires all Work to be

(Paragraphs deleted)

stopped.

§ 14.1.2 Not Used.

§ 14.1.3 If one of the reasons described in Section 14.1.1 exists, the Contractor may, upon seven (7) days' written notice to the Owner, the Initial Decision Maker and the Architect, terminate the Contract and recover from the Owner payment for Work executed in accordance with the Contract Documents and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery which loss arises as a direct result of such termination.

§ 14.1.4 If the Work is stopped for a period of sixty (60) consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven (7) additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

(Paragraphs deleted)

§ 14.2.1 The Owner may terminate, without prejudice and without waiving any other right or remedy the Owner may have, the Contract if the Contractor

.1 refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;

.4 otherwise is guilfy of substantial breach of a provision of the Contract Documents;

.5 Fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with all requirements of the Contract Documents;

.6 Refuses or fails to prosecute the Work or any separable part, with the diligence that will ensure its completion in accordance with the approved construction schedule for the Project as it may be adjusted in accordance with the Contract Documents; or

.7 Fails to comply with laws, rules, regulations, or directives regarding job site safety; or to comply with the provisions of the Owner's Contractor Environmental Health and Safety Manual, or orders or directives regarding safety issued by the Owner pursuant to the Contract.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exists and the Owner determines that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven (7) days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

In lieu of terminating the employment of the Contractor as regards the entirety of the Work, the Owner may elect to limit such termination to a portion of the Work and to require the Contractor to proceed with the balance of the Work in accordance with the Contract Documents.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds the sum of (i) the costs of finishing the Work, (ii) the compensation for the Architect's services and expenses made necessary thereby, and (iii) other damages incurred by the Owner and not expressly waived, such excess shall be retained by the Owner. If such costs and

damages exceed the unpaid balance, the Contractor shall pay to the Owner an amount equal to such excess. The amount to be paid to the Owner shall be certified by the Architect and Initial Decision Maker, upon application, and the obligation of the Contractor to make payment to the Owner under this Section 14.2.4 shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause and without prejudice and without waiving any other right or remedy the Owner may have, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit as and to the extent provided in the Contract Documents. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, without prejudice and without waiving any other right or remedy the Owner may have, terminate the Contract in whole or in part for the Owner's convenience and without cause. Termination by the Owner under this Section shall be by a notice of termination delivered to the Contractor specifying the extent of termination and the effective date.

§ 14.4.2 Upon receipt of a notice of termination for convenience, the Contractor shall immediately and in accordance with instructions from the Owner, proceed with performance of the following duties (regardless of whether or not there is agreement between the Owner and the Contractor as to amounts due to the Contractor and remaining unpaid hereunder):

.1 Cease operations as specified in the notice;

.2 Place no further orders and enter into no further Subcontracts for materials, labor, services or facilities except as necessary to complete Work not terminated;

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders;

.4 Proceed to complete the performance of Work not terminated; and

.5 Take actions that may be necessary or that the Owner may direct for the protection and preservation of the terminated Work.

§ 14.4.3 Upon such termination for the Owner's convenience, the Contractor shall be entitled to recover as its sole remedy for such termination, payment for terminated Work performed in accordance with the Contract Documents prior to the effective date of termination, payment for items associated with the terminated Work that were properly and timely purchased or fabricated off the Project site, delivered and stored in accordance with the Owner's instructions and satisfactorily evidenced demobilization costs. The Contractor hereby waives and forfeits all other claims for payment and damages, including without limitation, anticipated profits.

§14.4.4 In calculating the amount payable to the Contractor by the Owner upon termination for the Owner's convenience, the Owner shall be credited for (1) payments previously made to the Contractor for the terminated portion of the Work; (2) claims which the Owner has against the Contractor under the Contract and (3) the value of the materials, supplies, equipment or other items that are to be disposed of by the Contractor that are part of the Contract Sum.

§14.4.5 The payment to the Contractor pursuant to this Section may not exceed the total Contract Sum as reduced by:

.1 The amount of payments previously made by the Owner to the Contractor; and

.2 The portion of the Contract Sum allocable to Work not terminated.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a properly noticed demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

Claims by the Contractor against the Owner must be initiated within twenty-one (21) days after the occurrence of the event giving rise to such Claim or within fourteen (14) days after the Contractor first recognizes the condition giving rise to the Claim, whichever is later. Claims may also be reserved by the Contractor in writing within the time limits set forth in this Section 15.1.2. If a Claim is reserved, the Resolution of Claims and Disputes procedures described in this Article 15 shall not commence until a written notice from the Contractor in compliance with the requirements of Section 15.1.3 is received by the Owner. No such claim shall be valid unless so made. The Contractor waives all Claims and causes of action not commenced in accordance with this Section 15.1.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by the Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the Owner and to the Initial Decision Maker with a copy sent to the Architect.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and the Initial Decision Maker.

§ 15.1.3.3 All notices of Claims (whether before or after the period for correction of Work) must state the following in bold capital letters: **"THIS COMMUNICATION CONSTITUTES A NOTICE OF CLAIM"**. Any communication that does not include such statement shall not constitute a Claim under the Contract. As regards a notice of reservation of Claim, such notice must state the following in bold capital letters: **"THIS COMMUNICATION CONSTITUTES NOTICE OF RESERVATION OF A CLAIM"**. Any communication that does not include such statement shall not constitute a reservation of a Claim under the Contract. In addition, any notice of Claim or reservation of Claim must clearly identify the alleged cause and the nature of the Claim and include data and information then available to the Contractor to enable and to facilitate the Owner's verification and evaluation of the Claim.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision

Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

(Paragraphs deleted)

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§15.1.5.2 If the Contractor believes that additional cost is involved for reasons including but not limited to (1) a written interpretation from the Architect; (2) an order by the Owner to stop the Work where the Contractor was not at fault; (3) a written order for a minor change in the Work issued by the Architect; (4) failure of payment by the Owner; (5) termination of the Contract by the Owner; (6) Owner's suspension; or (7) other reasonable grounds, the Claim shall be made in accordance with the provisions of this Article 15.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. No such claim shall be valid unless made in accordance with the provisions of this Article 15. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

(Paragraphs deleted)

§ 15.1.7 Waiver of Claims for Consequential Damages

Not Used.

§ 15.1.8 Injury or Damage to Person or Property. If the Contractor suffers injury or damage to person or property because of an act or omission of the Owner, or of others for whose acts the Owner is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the Owner within a reasonable time not exceeding twenty-one (21) days after discovery. The notice shall provide sufficient detail to enable the Owner to investigate the matter.

§ 15.1.9 Claims for Concealed or Unknown Conditions: If, upon or subsequent to the Contractor's and its Subcontractors' site visits pursuant to Section 3.2.1 and performance of the tests, examinations, and inspections required by Section 3.2.2, the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor will promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 5 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different in the respects noted above and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. Any claim by the Contractor in opposition to such determination must be made within 21 days after the Architect has given notice of the recommendation. The Owner will have the final authority to accept or reject the Architect's recommendations, which decision by the Owner shall be subject to further proceedings pursuant to Article 15.

§ 15.2 Initial Decision

§ 15.2.1 Claims by the Contractor, excluding those where the condition giving rise to the Claim is first

discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Owner will serve as the Initial Decision Maker, unless otherwise indicated in Section 6.1 of the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, regardless of (1) whether such matters relate to execution and progress of the Work, or (2) the extent to which the Work has been completed. The decision by the Initial Decision Maker in response to a Claim shall not be a condition precedent to arbitration or litigation in the event (1) the Contractor has not provided substantiating evidence of its Claim; or (2) the Initial Decision Maker has failed to take action required under Section 15.2.2 within thirty (30) days after the Claim is made.

§ 15.2.2 The Initial Decision Maker will review Claims by the Contractor and within thirty (30) days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party; (2) reject the Claim in whole or in part; (3) approve the Claim; (4) suggest a compromise; or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims of the Contractor, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim of the Contractor or to furnish additional supporting data, such party shall respond, within ten (10) days after receipt of such request, and shall either (1) provide a response on the requested supporting data; (2) advise the Initial Decision Maker when the response or supporting data will be furnished; or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.4.1 If a Claim of the Contractor has not been resolved after consideration of the foregoing, the Initial Decision Maker will render a written decision on the claim, including any change in the Contract Sum or Contract Time or both, which decision shall be final and binding but subject to meeting and mediation pursuant to Section 15.3 of this document and arbitration or litigation pursuant to Connecticut General Statutes Section 4-61 and Section 15.4 of this Contract to the extent applicable.

§ 15.2.5 Not Used.

§ 15.2.6 Not Used.

§ 15.2.6.1 Not Used.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 Not Used.

§ 15.3 Mediation

§ 15.3.1 Claims of the Contractor except those waived as provided for in Section 9.10.5 shall be submitted to the meeting and mediation process described in the Sections which follow, prior to and as a precondition to the Contractor pursuing any other available remedy. Claims by the Owner, at the option of the Owner, may be submitted to such meeting process and/or mediation process, and, in such event, Contractor shall be required to submit to and participate in such a meeting and/or mediation. The meeting shall be between the parties and attended by individuals with decision-making authority regarding the dispute, to attempt in good faith to

negotiate a resolution of the dispute.

§ 15.3.2 The meeting referenced in Section 15.3.1 shall be held promptly, but not less than fourteen (14) days after a party's request for the meeting. The Contractor shall not submit any claim to mediation in accordance with the provisions of Sections 15.3.1 through 15.3.6 until fourteen (14) days after the date of the meeting.

§ 15.3.3 In connection with any such mediation, a request for mediation shall be made in writing, delivered to the other party to the Contract. The request may be made concurrently with the filing of applicable binding dispute resolution proceedings, if any, but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of sixty (60) days from the date of filing, unless stayed for a different period of time by agreement of the parties or as modified by court order.

§ 15.3.4 The parties will jointly appoint a mutually acceptable mediator, seeking assistance in such regard from a mutually agreed upon dispute resolution entity if they have been unable to agree upon such appointment within twenty (20) days from the submittal of the request for mediation. If the parties are unable to agree on the dispute resolution entity, the mediation shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of this Contract.

§ 15.3.5 The parties agree to participate in good faith in the mediation and negotiations related thereto for a period of sixty (60) days from the date of submittal, or until the parties reach an impasse as evidenced by a letter from a party to the mediator, whichever first occurs. If the parties are not successful in resolving the dispute through mediation, then the parties may pursue other legal remedies available to them.

§ 15.3.6 Should the Owner request, the Contractor agrees to participate as a party in any mediation proceeding between the Owner and the Architect or other Consultant for the Project in which construction deficiencies, contract breaches, or other alleged wrongful acts by the Contractor are alleged.

§ 15.4 ARBITRATION OR LITIGATION OF CLAIMS

§ 15.4.1 Not Used.

§ 15.4.1.1 Not Used.

§ 15.4.2 Not Used.

§ 15.4.3 Not Used.

§ 15.4.4 Should the Owner have a claim against the Contractor, the parties agree that the Owner, whether or not it elects to proceed with the meeting process or mediation described in Section 15.3, shall have the option of either prosecuting the claim against the Contractor in an appropriate court of general jurisdiction, or by arbitrating the claim by filing a demand for arbitration pursuant to the rules of a dispute resolution entity agreed upon by the parties, except that if the parties cannot agree upon a dispute resolution entity, the rules of the American Arbitration Association shall apply.

§ 15.4.5 Should the Contractor have a claim against the Owner which has not been resolved by mediation or any other procedure set forth in this Contract, the Contractor's rights to assert its claim against the Owner shall be subject to the provisions of Connecticut General Statutes Section 4-61.

§ 15.4.6 Consolidation or Joinder

§ 15.4.6.1 Should either the Contractor institute an arbitration to the extent authorized by Section 4-61 of the Connecticut General Statutes or the Owner institute an arbitration as set forth herein, the Contractor agrees that any such arbitration may be consolidated, at the Owner's discretion, with any arbitration proceeding involving the Owner and the Architect or other Consultant for the Project in which construction or design deficiencies, breaches of contract, or any other alleged wrongful acts by the Contractor or Architect are alleged.

§ 15.4.6.2 Not Used.

§ 15.4.6.3 Not Used.

ARTICLE 16 OWNER POLICIES

§ 16.1 The Contractor shall, at no additional cost to the Owner, comply with all policies and procedures of the Owner. In the event the Owner establishes new policies or procedures following the execution of the Contract, or makes modifications to policies or procedures in existence at the time of Contract execution, the Contractor shall comply with such new or modified policies or procedures upon receipt of written notice of such new policies or procedures.

ARTICLE 17 SOVEREIGN IMMUNITY

§ 17.1 The parties acknowledge and agree that nothing in this Contract shall be construed as a waiver by the State of Connecticut or the Owner of any rights or defenses of sovereign immunity, which it may have had, now has, or will have with respect to all matters arising out of this Contract. To the extent that this provision conflicts with any other provision hereunder, this provision shall govern.

These General Conditions may be executed in counterparts, and each counterpart shall have the same force and effect as an original and, when taken together, shall constitute one and the same instrument and an effective binding agreement on the part of each of the undersigned. Execution of a facsimile or PDF copy shall have the same force and effect as execution of an original. Signed copies of these General Conditions may be faxed or e-mailed with the same force and effect as if the originally executed General Conditions had been delivered.

Acknowledging agreement to these General Conditions as of _____, 20___.

UNIVERSITY OF CONNECTICUT

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
Scott A. Jordan Executive VP for Administration & CFO	
Duly Authorized *(Printed name and title)*	Duly Authorized *(Printed name and title)*
Date:	Date:

(Paragraphs deleted)

University of Connecticut

830 Bolton Road
Storrs, Connecticut

UCONN STORRS CAMPUS
AC Renovations for
Rehearsal and Work rooms

Fine Arts Building

PROJECT #901667

Project Manual -100% CD

November 8, 2019
van Zelm #2019031.00

van Zelm, Heywood & Shadford, Inc.
10 Talcott Notch Road
Farmington, CT 06032-1800

SPECIFICATION
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- END –

SECTION 011000 - SUMMARY

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. Section Includes:
1. Related Documents
2. Summary
3. Project information.
4. Work covered by Contract Documents.
5. Work under separate contracts.
6. Definitions
7. Time of Completion.
8. Documents required before execution of the Contract.
9. Access to site and use of the Site.
10. Coordination with occupants.
11. Work restrictions.
12. Work Sequence.
13. Miscellaneous provisions.

B. Related Requirements:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

2. Division 01 Section “Submittal Procedures” for submittal requirements prior to start of work.

1.3 PROJECT INFORMATION

A. Project Identification: UCONN – Storrs Campus Improvements, AC Renovations, Fine Arts Building, Project No. 901667.

1. Project Location: Storrs Campus, 830 Bolton Road, Storrs, CT.

B. Owner: University of Connecticut.

1. Owner's Representative: Sallyann Beaudet, UConn Planning, Design and Construction Building, 31 Ledoyt Road, Storrs, CT 06268

C. Engineer: vanZelm, Heywood & Shadford, Inc., 10Talcott Notch Road, Farmington, CT 06032.

1. Engineer's Consultants: The Engineer has retained the following design professionals who have prepared designated portions of the Contract Documents: None.

D. Other Owner Consultants: The Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. None.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The Base Bid for this project is to provide air conditioning for 2 Rehearsal Classrooms and one Work Room in Building C, including modifications of the existing mechanical, plumbing and electrical systems to accommodate the new equipment as shown on the Contract Documents.

2. Removal of all debris caused by this Contract.

3. Protection of the public, building, grounds from damage during this contract is the responsibility of the Contractor for this project at all times.

4. Repair or replace landscaping including trees, shrubs or other planting disturbed during the Work of the contract with new to match existing, unless otherwise noted. Re-grade and reseed any grass area damaged as a result of the Work. Repair any walkways or paved areas damaged as a result of the Work.

1.5 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with contractors that may have been issued separate contract(s) to perform certain construction operations at the site prior to construction activity under this contract so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.6 DEFINITIONS UNDER THE CONTRACT DOCUMENTS

A. Architect, Engineer, Architect/Engineer, A/E or Designer: The term used to designate the Professional Consultant who contracts with the Owner to provide the Architectural and Engineering services for the Project. The Architect is a separate sub-consultant and not an agent of the Owner. The term includes any associates or consultants employed by the A/E to assist in providing the overall services.

B. Contract Documents: The Contract between Owner and Contractor signed by the Owner and the Contractor and any documents expressly incorporated therein for the Project. Such incorporated documents customarily include the Contract and General Conditions, any Supplemental General Conditions, any Special Conditions, the plans and the specifications, and all modifications, including addenda and subsequent Change Orders.

C. Contractor: The person or entity with whom the Owner has directly entered into a contractual agreement to do the Work. Applies to Construction Manager, General Contractor or Prime Contractor.

Companies that are owned or operated by the same individual, close relations, parent company or who operate under the same address and/or building, such companies are considered as one in the same company and not as separate trade supplier or installers who subcontract and/or supply to each other. Such entities are viewed as a single pooled resource. And therefore not subcontractors

D. Day: Means a calendar day, 24-hour period. All response times and schedules shall be based on a calendar day, unless specifically noted otherwise.

E. Daily Construction Report: A written daily log recording the day's construction site activities conditions and progress.

F. Daily Additional Work Tickets: Recording the day's trade labor work performed for a change in the work issued by a CCD.

G. Drawing: A page or sheet of the Plans which presents a graphic representation, usually drawn to scale, showing the technical information, design, location, and dimensions of various elements of the Work. The graphic representations include, but are not limited to, plan views, elevations, transverse and longitudinal sections, large and small scale sections and details, isometrics, diagrams, schedules, tables and/or pictures.

H. Notice to Proceed: A written notice given by the Owner to the Contractor (with a copy to A/E) fixing the date on which the Contract time will commence for the Contractor to begin the prosecution of the Work in accordance with the requirements of the Contract Documents. The Notice to Proceed will customarily identify a Contract Completion Date.

I. Owner: Office of University Planning, Design and Construction.

J. Project: The term used instead of the specific or proper assigned title of the entire undertaking which includes, but is not limited to, the "Work" described by the Contract Documents.

K. Project Manager: The Project Manager as used herein shall be the Owner's designated representative on the Project. The Project Manager shall be the person through whom the Owner generally conveys decisions. The Owner may change the Project Manager from time to time or may appoint an interim Project Manager.

L. Site: Shall mean the location at which the Work is performed or is to be performed. Also referred to as Work Zone, Site Logistics Plan, and Construction Area.

M. Specifications: That part of the Contract Documents containing the written administrative requirements and the technical descriptions of materials, equipment, construction systems, standards, and workmanship which describe the proposed Work in sufficient detail and provide sufficient information for the Contractor to perform the Work.

N. Subcontractor: A person or entity having a direct or indirect contract with the Contractor for the performance of the Work. Subcontractor includes any person or entity who provides on-site labor but does not include any person or entity who only furnishes or supplies materials for the Project.

Companies that provide and install products that they receive from a wholesaler or distributor and not directly from the manufacturer/fabricator/producer, are considered Dealers. Dealer entities are recognized as Subcontractors and shall follow the same requirements under the contractor documents. Dealer's shall disclose their net costs for materials and equipment.

O. Where the contract documents refer to the "Contractor", the requirements under the contract shall also apply to the Subcontractor.

P. Submittals: All shop, fabrication, setting and installation drawings, diagrams, illustrations, schedules, samples, and other data required by the Contract Documents which are specifically prepared by or for the Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by the Contractor to illustrate material or equipment conformance of some portion of the Work with the requirements of the Contract Documents.

Q. Substantial Completion: The entire work shall not be limited to physical construction. The Work for Substantial Completion shall include aspects of general conditions and general requirements.

R. Supplier: A manufacturer, fabricator, wholesaler or distributor, who provides material for the Project but does not provide on-site labor. A subcontractor or sub-tier subcontractor cannot be also a material supplier. See definition of Subcontractor which addresses Dealers.

S. Time for Completion: The number of consecutive calendar days following the issuance of the Notice to Proceed which the Contractor has to substantially complete all Work required by the Contract. When the Notice to Proceed is issued, it states a Contract Completion Date, which has been set by the Owner based on the Time for Completion.

T. Work: The services performed under this Contract including, but not limited to, furnishing labor, and furnishing and incorporating materials and equipment into the construction. The Work also includes the entire completed construction, or the various separately identifiable parts thereof, required to be furnished under the Contract Documents.

1.7 TIME OF COMPLETION

A. The established Substantial Completion Date or number of consecutive calendar days (if specifically outlined) following the issuance of the Notice to Proceed which the Contractor has to substantially complete all Work required by the Contract. Work required by the project shall commence immediately upon receipt of a Notice to Proceed.

1. The Contractor shall obtain the Certificate of Substantial Completion as defined in the Contract Documents within **60** calendar days (40 business days) of the Notice to Proceed.

2. Due to the nature of this institution, it is required that the academic schedule must be maintained. Contractor shall cooperate and coordinate with the Owner to assure that the academic schedule will be maintained.

1.8 DOCUMENTS REQUIRED BEFORE EXECUTION OF A CONTRACT

A. Contractor shall provide the following documents for the scope review meeting or if there is no scope review meeting provide the list of required documents within the time period outlined within the Letter of Intent to award:

B. Project Specific Milestone Construction Schedule in sufficient detail as required under Section 3200 Construction Progress Documentation.

C. Labor Rates for trade labor work self-performed by the Contractor shall be issued utilizing the labor rate form template provided by the Owner. Template can be found at the following weblink: http://updc.uconn.edu

1.9 ACCESS TO THE SITE AND USE OF THE SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas indicated; allow for Owner occupancy and use by the public. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. **Limits:** Confine construction operations to areas within the Project limits indicated in the contract documents. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

a. Changes to the location of the identified perimeter contract limits, including access to the project site shall not be assumed by the Contractor. Contractor must submit a detailed narrative to the Architect and Owner on impacts to constructability as to why the contracted Project limits cannot be maintained.
b. Restore all lawn, sidewalk, paved areas damaged by vehicles and or construction activities to their original or better condition. See Section on Temporary Facilities and Controls for more details.
c. All grounds including construction site within contract limit shall be kept neat and orderly at all times.

2. **Driveways, Walkways and Entrances:** Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, other contractors and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
   a. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

3. **Burial of Waste Materials:** No not dispose of organic and hazardous material on site, either by burial or by burning.

4. **Construction Entrances:**
   Contractor shall prevent sediment from being transported onto paved areas and roads by construction vehicles exiting the project site. Contractor shall be responsible for immediate clean-up of soils or sediments tracked onto paved off site areas including but not limited to sweeping with motorized sweepers and power washing paved areas as required.
   a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
   b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

5. **Condition of Existing Building:**
   Maintain portions of existing building affected by construction operations in a weather tight condition throughout construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

6. **Condition of existing perimeter Buildings and Landscape:**
   Protect surrounding buildings from noise, dust/dirt and pollution caused by the construction of the project. Take all precaution necessary to protect the surrounding space and maintain controls.

7. **Contractor Parking:**
   All Contractors working for the University of Connecticut at the Storr's and regional campuses will follow the University Policy on Contractor Parking. A modest quantity of campus parking spaces shall be made available within the contract limits. Such policy can be located utilizing the following link; http://policy.uconn.edu/2016/02/04/contractor-parking-policy.

8. **Access to the Campus and Site:**
   As it relates to the Storrs Campus, Contractor shall restrict use of construction related trucks on local, secondary roads, such as Hillyndale, Eastwood and Westwood Road, Hunting Lodge, Separatist and North Eagleville Road (from Hunting Lodge to SR 32) by using SR 195, SR 275 and North Hillside Road (from SR44 to North Eagleville Road on campus) as primary travel routes to the campus. Contractor shall not authorize the use of these secondary roads by construction related trucks in support of the project without explicit pre-authorization from the Owner on a per project basis.

   Road Restrictions Map can be found at the following web link: http://updc.uconn.edu

Refer to Section 01-3300 Part 2.1.L Safety Plan for submittal requirements prior to site access.

Refer to Section 01-5000 Temporary Facilities and Controls for additional requirements.

Refer to Section 01-5719 Temporary Environmental Controls for additional requirements.

1.10 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
   2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

B. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work or infer that the Contractor has met Substantial Completion.

   1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Owner occupancy.

   2. This project has been identified as a Threshold Building subject to the requirements of Connecticut General Statutes Section 29-276b. Obtain a Certificate of Occupancy from Building Officials prior to Owner occupancy.

3. Certifications. The Contractor at completion of construction shall provide to the University a "Certificate of Substantial Compliance with the State Building and Fire Safety Codes" bearing original signatures of an officer of the company stating: "This is the CERTIFY that in my professional opinion the complete structure/renovations described above is in substantial compliance with the approved construction documents on file with the University of Connecticut. Minor deviations and special stipulations are noted below (if any)".

4. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon recognition of mechanical and electrical systems being fully functioning and successfully inspected and tested for completeness, the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

1.11 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations, the use of public streets and with other requirements of authorities having jurisdiction.

1. Work off Campus or on the edge of any campus where town residence property back up to or in close proximity to the Work, shall adhere to the Owner's noise limits.
    a. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 4:30 p.m., Monday through Friday, unless otherwise indicated. Permission must be requested and approved in writing prior to performance of the work outside the normal working hours or on a State Holiday.

    b. Early Morning Hours for Dormitory Work: No noisy activities where the noise exceeds 55 dBA can take place prior to 8:00 am when working on or in the vicinity of a student dormitory.

Refer to Section 5719 Temporary Environmental Controls for other acceptable noise levels during working hours.

2. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
    a. Obtain Owner Representative written permission before proceeding with utility interruptions.

3. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
    a. Notify Owner Representative not less than two days in advance of proposed disruptive operations.
    b. Obtain Owner's written permission before proceeding with disruptive operations
    c. Noise which exceeds 55 db at the site perimeter will not be permitted between the hours of 8:00 PM and 8:00 AM.

Controlled Substances: Use of tobacco products and other controlled substances is not permitted on the Owner campuses.

In addition to reasons determined by the University, approval of deviations in work hours is dependent upon availability of University supervisory personnel.

If the Contractor or Owner determines that work on this project must be performed during a time other than normal working hours of the University, costs for any premium time must be included in the Base Bid.

No Work may be conducted during University exam periods, convocation/commencement day, graduation day and student move in / move out days (including Fridays) without the written permission from the Owner. Exam periods which may affect this project are scheduled per attached link: http://www.registrar.uconn.edu/calendar.htm

1.12 WORK SEQUENCE

The responsibility of phasing the Work falls entirely on the Contractor.

1.13 MISCELLANEOUS PROVISIONS

1. Certifications
   a. The Contractor, at completion of construction, shall provide to the University a "Certificate of Substantial Compliance" bearing original signatures of an officer of the company stating: "This is to CERTIFY that, in my professional opinion, the complete structure/renovations described above is in substantial compliance with the approved construction documents on file with the University of Connecticut. Minor deviations and special stipulations are noted below (if any)"
   b. The Contractor shall provide licensed and/or specific certification(s) of subcontractors who self-perform the work. Contractor shall provide a list of suppliers and all subcontractors and sub-tier subcontractors that have performed work on the project under the contract. Refer to close out provisions for additional requirements.

2. Owner Supplied Documents

   a. The majority of the Owner's buildings were constructed prior to 1978 and are likely to have painted surfaces contacting lead based paint. Any information the Owner provides on known location of lead base paint or other hazardous materials. Any information the Owner provides on known locations of lead based paint or other hazardous materials is offered, in good faith for information only, solely for the purpose of placing the Contractor in receipt of all information known to the University at this time. Unless otherwise provided, this data is not to be considered a part of the contract documents. The University does not warrant or represent that the information contained in these reports is complete or accurate but only that it constitutes a disclosure of the information known to the Owner at this time regarding these conditions.

b. Original construction drawings are provided for information and reference only and do not represent exact conditions existing in the buildings. The Contractor is responsible for all work described in the scope of work regardless of information provided in the reference drawings. This information is offered in good faith for information only, solely for the purpose of placing the Contractor in receipt of all information known to the University at this time. Unless otherwise provided, this data is not to be considered a part of the contract documents. The University does not warrant or represent that the information contained in these reports is complete or accurate but only that it constitutes a disclosure of the information known to the Owner at this time regarding these conditions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012300 - ALTERNATES

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. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum and Contract Time

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

E. Alternates shall be valid for the life of the contract. Alternates not selected at the time of award, but not identified as rejected may be selected within the time frame identified by the Contractor through the construction schedule where the selection will not impact the critical path and overall substantial completion of the contract. Should the Owner wish to exercise executing an Alternate after the last date reflected within the CPM Construction schedule for selection of an Alternate, the Alternate(s) may be negotiated as applicable, in accordance with the requirements associated with a Proposed Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Replace Condenser Water Pumps P-1, P-2 and P-3

1. Provide and install new condenser water pumps and associated suction straighteners, as indicated on Sheets M1.2 and M4.1, and in Specification 232123, Hydronic Pumps. Include all associated demolition, installation, electrical work, system modifications startup and balancing, finish work.

B. Alternate No. 2: Replace Sand Filter SF-1

1. Provide and install new sand filter unit. Provide costs for additional material and labor required (Div 23 and Div 26) with providing new filter system. General cost for removal and re-installment of existing SF-1 is part of base bid. Bid alternate 2 to include only material cost and labor beyond base bid. Reference Sheet M1.2 and Specification 232500, HVAC Water Treatment.

C. Alternate No. 3: Replace Chemical Water Treatment System with Non Chemical Type

1. Provide and install new non-chemical water treatment system. Include all associated demolition, installation, system modifications (Div 23 and 26), start up and balancing, finish work. Reference Sheet M1.2 and Specification 232500, HVAC Water Treatment.

D. Alternate No. 4: Stainless Steel Option for CT-1 and CT-2

1. Provide all stainless steel construction for cooling towers, per manufacturer's standard option. Reference Sheet M1.2 and Specification 236500, Cooling Towers.

END OF SECTION 012300

SECTION 012500 - 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. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Alternates" for products selected under an alternate.
3. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
4. Divisions 02 through 26 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor that are not required in order to meet other Project requirements but may offer advantages to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A or similar.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable. Provide documentation that supports such submission

b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project name and contact names, current phone numbers and addresses of architects and owners who were directly involved with accepting the product substitution.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Safety Data Sheet that demonstrates that the product does not contain any hazardous material as defined in Section 01-7839 Project Record Documents.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Savings to the Owner, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Engineer will notify the Owner of their recommendation to accept or reject the submission. Upon Owner decision, Engineer will notify Contractor of acceptance or rejection of proposed substitution within seven (7) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Executed substitution form and/or a Change Order.
b. Use product specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. If applicable, engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than Thirty (30) days prior to time required for preparation and review of related submittals.

1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Requested substitution is fully documented and properly submitted.
d. Requested substitution does not contain any hazardous material.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
k. Requested substitution does not require additional design changes to be performed by the Engineer in order to incorporate the substitution into the work.

B. Substitutions for Convenience: Such request shall be submitted by the Contractor ten (10) days prior to contract execution. Should an approval of any substitutions for convenience be submitted for consideration after contract execution, it shall be at the sole discretion of the Owner whether to consider it or not. If the substitution is not accepted than the Contractor is obligated to supply the originally specified product at no additional cost to the Owner. If the substitution is accepted all coordination and liability is the sole responsibility of the Contractor. Contractor shall follow all requirements as outlined for Substitution for Cause.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - 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. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Division 01 Section "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on **AIA Document G710, "Architect's Supplemental Instructions" (ASI).** The Contractor shall proceed with minor changes in the work shown on ASI's.

1.4 ENGINEER PROPOSAL REQUESTS OR BULLETINS

A. Initiated Proposal Requests: Engineer or Owner will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

B. Proposal Requests (PR) or Bulletins issued by the Engineer are not instructions either to stop work in progress or to execute the proposed change. The Contractor shall only proceed with the change work when a CCD or CO is counter-executed by the Owner.

1.5 ADMINISTRATION OF CHANGES IN THE WORK

A. Changes to the work shall be submitted in accordance with these contract document requirements.

1. Section 4b-24 of the Connecticut General Statutes, the public auditors of the State of Connecticut and the auditors or accountants of the Owner shall have the right to audit and make copies of the books of the Contractor employed by the Owner.

B. Labor Rates: Utilize the Owner's Labor Rate Sheet template which can be obtained through the Owner's website (http://updc.uconn.edu). No other format shall be utilized. Previously agreed upon labor rates shall not be utilized in establishment of labor rates for this project.

1. Prior to the submission of the first application for payment or within 21 days from the contract start date whichever comes first, the Contractor will obtain from their subcontractor's labor rates for all their self-performed trade labor work for review in the format provided by the Owner. The labor rates shall be inclusive of benefits, applicable taxes and worker compensation insurance. When calculating labor rates, rates shall not include those general and administrative overhead costs and profit identified within the contract. Labor rates shall be valid for the life of the project; no rate adjustment shall be allowed for any increases to prevailing wage while under the contract.
2. All labor rates are subject to thorough analysis and possible adjustment prior to their acceptance by the Owner. Analysis review shall include but not be limited to:

a. Labor Rates submitted are only for the Contractor identified on the rate sheet for review and approval. Rates are for the identified Contractor's self-performed trade labor work.
b. Compliance with prevailing wage
c. State and Federal wage taxes
d. Contractors current worker's compensation premium statement that includes modification ratings
e. Current union agreements to which the Contractor is a party.
f. Payroll of employees if deemed necessary to confirm base wage and fringe of proposed trade labor category.
g. Labor rates cannot be interchangeable from Contractor to subcontractor or from subcontractor to subcontractor.

C. Labor Representation: (Contractor's or Subcontractor's own self performed forces)

1. No Proposed Change Order shall be negotiated if the request is solely for the increased labor rate over those originally carried by the Contractor in its original bid.
2. Additional Foreman hours shall not be included unless additional crews are added. Additional Superintendent hours shall not be included unless a compensable time extension is granted. Project Executive and Project Manager time shall not be included as a direct cost as it is part of the overhead mark-up allowed.
3. Labor efforts shall be on the direct time performing the work. If a worker performs work under one particular trade category and then switches to perform work under another trade category in one work day, such work shall be represented as the worker's direct time performing each of the trade categories for that work day.

4. Overtime, increased manpower, and additional shifts:

    a. The Contractor shall take necessary steps to maintain project schedule.
    b. If the Contractor is not behind Schedule and the Owner requests an acceleration of the work, the Owner will pay the Contractor the actual additional premium portion of the wages for overtime or additional shift work not included in the Contract price.
    c. If the Contractor, through its sole or partial fault or neglect is behind Schedule, the Contractor shall at its own expense, increase its manpower or to work any overtime or additional shifts or take other action necessary to expedite the Work to meet the Project Schedule.

D. Equipment Rates: Contractor shall submit for review and approval by the Owner an hourly, weekly and monthly rate for each self-owned equipment. List shall provide the following information:

1. Type of Equipment
2. Year
3. Make
4. Model
5. Size / Capacity
6. Registration #

E. Proposed Cost: The Owner may rely on supporting documentation provided by the Contractor and/or Subcontractor in agreeing to a cost for the change. If the Owner believes that additional information is necessary to substantiate the accuracy of the cost, the Owner reserves the right to request and receive additional information from the Contractor. The proposed cost must be based upon those identified in support of a Proposed Change Order.

1. Proposed cost estimated by the Contractor on behalf of the subcontractor shall be prohibited.
2. General Conditions / General Requirements shall be calculated on the actual cost impact to the critical path schedule. If the time extension does not extend beyond the month identified within the contract documents, only on-site field labor costs shall be allowed.

F. Construction Change Directive (CCD): Where the lack of timely authorization would impact the critical path schedule of the work or where the entitlement to additional cost is not clear or is not in total agreement by the parties, the Owner may issue a Construction Change Directive on a modified AIA Document G714 form. The Contractor shall immediately proceed with the change in the Work as indicated and directed in the CCD. Issuance of a CCD to the Contractor shall also be considered an issuance of the directive to the subcontractor(s) to proceed with the work.

1. Contents: The CCD will contain a complete description of the change in the Work. It will also designate the method to be followed to determine the adjustment in the Contract Sum and/or the Contract Time, if any. The Contractor may be requested to provide an order of magnitude (not to exceed) cost estimate for the change in the work. However, an executed CCD shall not be the sole backup to a Proposed Change Order (PCO) nor shall

the execution of a CCD as a "Lump Sum" be considered binding as such when transposing into a change order.

2. Documentation: Contractor's order of magnitude estimate of the work on Contractor letterhead or email reflecting at a minimum the following:

   a. Breakdown of how the cost estimate was established
   b. Inclusive of all work effort associated with the change. Inclusive of applicable supervision and any estimated extension of time.

3. Execution: If issued as a Time and Materials and/or Not to Exceed, the documentation and monitoring of the work shall be reflected on daily "Additional Work Tickets" received from subcontractors and/or documented by the Contractor and consists at a minimum, the following:

   a. Filling out of daily additional work tickets documenting the additional work performed from beginning to completion of the work.
   b. The date of the day the work is performed.
   c. Project Name
   d. Contracting Firm's name.
   e. Person's full name clearly printed who is monitoring and tracking the work being performed.
   f. Name of the company performing the work and what work is being performed.
   g. Number of workers, by trade labor category.
   h. Number of hours worked by each worker.
   i. Signature of the person monitoring the work certifying that the information contained on the Daily Additional Work Tickets is true and accurate. An additional signature by the Owner verifying the work performed on the ticket is preferred.
   j. Owner reserves the right to not accept rely on or accept information represented on the daily additional work tickets if Owner did not verify the tickets.

G. Proposed Change Orders (PCO): Contractor shall utilize the most current Owner PCO and Labor Rate Sheet templates which can be obtained through the Owner's website (http://updc.uconn.edu). No other format shall be utilized.

1. Submit to the Engineer and Owner a complete itemized PCO within seven (7) working days from the date reflected on the Proposal Request or when response to an RFI has been received. If the PCO and backup is incomplete the Engineer will notify the Contractor within seven (7) days to revise and resubmit. Contractor is to identify revisions to the submitted PCO document by enumerating as the PCO number -R1, -R2, R3 etc. and date of the revision being submitted.

   a. If a Proposal Request was not issued for the change, submit a PCO within seven (7) days from the date the initial discovery for change was formally documented.

2. Include within the PCO template a list of quantities of labor and/or products required or eliminated and/or pre-approved unit costs, with total amount of purchases and credits that encompass the changes identified and affected by the proposal request. If requested, furnish survey data to substantiate quantities.

3. Forms must be drafted and signed by the authorized agent of the Contractor or their subcontractor represented on the PCO. Contractor shall not formulate, calculate or submit proposed costs for a change on behalf of the sub-tier subcontractors and suppliers. All sub-tier contractors and suppliers shall submit their costs on supporting company letterhead in the format outlined within.
4. Electronic signatures from the submitting Company and its Representative identified on the PCO form is preferred. Failure of the Contractor or Subcontractor to sign the form, shall not relieve the Contractor of their obligations to represent true net costs for the change. Information misrepresented knowingly or unknowingly to receive financial gain, shall be a breach of their obligations to perform nor allow for a claim under the contract.
5. Failure of the Contractor to timely submit complete itemized PCO's, such failure shall not relieve the Contractor of their obligations to perform nor to allow for a claim under the contract.
6. Markup shall be calculated with combined overhead and profit in a single percentage as identified as allowed within the General Conditions of the contract for both the Prime Contractor and Sub-tier Contractors.
7. Changing the distribution of the percentage of allowed markups identified within the contract shall be prohibited.

H. The basis for each PCO shall be identified and a copy of the following shall be provided:

1. Entitlement

   a. On the format required by the Owner, summarize and describe the need for the change and the basis of the entitlement for an increase and/or extension to the contract sum or contract time;
   b. Identify all pertinent project information, sequential tracking, and original issue date and revision dates (if any);
   c. Classification of the PCO as being predominately due to Unforeseen Field Conditions or the actions or requests of the Contractor, the Owner or Engineering Firm; and
   d. List the proposed change value for each effected Prime Subcontractor and lower tier Subcontractor(s).

2. Supporting Documentation for Entitlement: Include a copy of the document that initiated the PCO, which may include one or more of the following:

   a. A copy of an executed Proposal Request (PR) from the Engineering Firm or Owner with all attachments;
   b. A copy of a Bulletin from the Engineer of Record;
   c. A copy of a Sketch(s) issued by the Engineering Firm clearly outlining the change;
   d. A copy of an inspection report or notes by an official having jurisdiction's that identifies a directive for a change;
   e. A copy of any pertinent Field Directives, RFI's, e-mails or other correspondence regarding the change, if applicable; and
   f. A copy of the executed CCD form, (where applicable).

g. Where a request for an extension of time is included, a copy of the CPM project schedule reflecting the direct impact to the critical path and any other documents required by the Owner shall be provided.

3. Supporting Documentation for Costs

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

b. Copies of all supporting quotes from the material suppliers and sub tier work (detailed below). The PCO supporting documentation should identify the companies submitting the information and the individuals who prepared the quotations.

c. Calculate the labor required to complete the work utilizing the contractually approved hourly rates of the submitting Contractor and their subcontractor's self-performed trade labor category as established in the contract. Where there are not preapproved labor rates for the Contractor or subcontractor's self-performed trade labor category of work, submit labor rates in the format required by the Owner for review and approval.

1. Hourly labor rates shall not include Overhead and Profit (O&P), small tools, or any other general conditions costs as identified in the contract under Sec. 7.2.2.8 of the AIA 201 between the Owner and Contractor.

a) Note that the definition of "small tools" includes equipment utilized in the normal course of work including items such as shovels, picks, rakes, ladders, and power tools which are expected to be utilized on a project. Trade related equipment, hand tools, and power tools normally supplied with the labor or that are normally expected to be owned in the performance of the typical work for a trade are not compensable. These costs shall not be approved as part of the Direct Cost of a Change Order as they are included in the Contractor's overhead mark-up percentage.

b) Additional Supervisory or Foreman hours shall not be included in the cost calculation for the change unless additional crews are necessary and added and/or a compensable time extension is granted.

c) General Foreman and Project Management support is considered as part of overhead and profit.

d) Labor Rates shall not be limited to trade labor categories as defined within the prevailing wage schedule applicable to the project. Include labor costs for offsite sheet metal fabrication, air balancing, engineering and programming services in support of the project,

e) Approved Labor Rates are for the life of the contract term and therefore not adjustable unless the contract completion date is extended beyond the month of June within the year the contract was to be completed. Adjustment to pre-approved labor rates shall only be considered for change order work issued after receipt of Final Completion.

f) Forms must be drafted and signed by the authorized agent of the Contractor or subcontractor who is self-performing the trade work represented on the labor rate sheet. Contractor shall not misrepresent proposed labor rates from the sub-tier contractors.

d. Provide a detailed and itemized break-down of all anticipated material and equipment costs, with the unit cost per item multiplied by the number of units. Additional documentation is required as follows:

1. Supporting quote from a material supplier reflecting the units and unit cost(s) for each item type;
2. Supporting quote from the equipment supplier, with the hourly rental rate multiplied by the number of hours. One of the following shall be submitted in support of the equipment costs:

a) When equipment is rented from a third-party, supporting rental quote from the supplier reflecting daily/weekly/monthly equipment costs (whichever applies) for equipment.
b) When equipment is owned and used directly on the change work by the Contractor or subcontractor, the daily rate shall not exceed the rate calculated by taking the monthly rental rate as identified by a nationally recognized construction cost estimating guide or service and divided by 20 days. The weekly or monthly rate (respectively) shall not exceed the weekly/monthly rate calculated by a nationally recognized construction cost estimating guide or service. Year, make and model of the equipment must be provided and used as the basis for establishing the rental rate.

e. If the PCO is made on a “unit cost” basis as part of the established contract, provide a copy of approved unit costs reflected in the contract, or if the unit cost was not identified in the contract, provide a complete breakdown of how the unit cost was arrived at with supporting documentation as prescribed above.
f. If the work was previously performed based on issuance of a CCD on a Time & Material and/or Not to Exceed basis, provide:

1. Daily Additional Work Tickets as outlined above.
2. Actual material and rental supplier invoicing.
3. Subcontractor billings with actual material and rental supplier invoicing.

g. To the extent that work is subcontracted to Lower Tier Subcontractors, anticipated labor, materials and equipment of sub-subcontractor costs shall be substantiated and consistent with the guidelines prescribed above.
h. Costs calculated and represented are not to be rounded up or down.

I. Allowance Adjustment: See Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

J. Unit-Price Adjustment: See Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's acceptance of the information contained in a Proposed Change Order, Engineer will issue a Change Order for signatures of Owner, Engineer and Contractor on AIA Document G701.

a. Follow requirements for PCO's as outlined above.
b. Each Change Order shall list and reflect the following:

1. Each PCO # included within the change order;
2. Each CCD# (when applicable to an identified PCO);
3. Brief description of the work included within the PCO;
4. Dollar value of the PCO
5. Total of all PCO's represented

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 013100 - 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. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Informational Submittals
2. General coordination procedures.
3. Coordination drawings.
4. Requests for Information (RFIs).
5. Project Meetings.
    a. Pre-construction conference
    b. Pre-installation conference
    c. Progress meetings
    d. Coordination meetings
    e. Landscape Status Updates
6. General Administration

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms contracted for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use of CSI Form 1.5A or similar. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Background screens on each individual performing any type of work on the project that will be coming to the project site for any length of time.

B. Key Personnel: Provide at the pre-construction meeting a list of key personnel assignments, including project manager, superintendent, safety engineer and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list business addresses and telephone numbers, including office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Keep list current and available at all times.
2. The Owner requires as a minimum, the following Key Personnel be assigned to this project. Each position shall be with an individual knowledgeable in the work that they will be providing under this contract and who is employed full-time under the Contractor, dedicated to the position listed.

    a. Project Manager (on site a minimum of once a week for duration of the project through closeout)
    b. Project Superintendent (on-site full time for duration of the project through closeout)
    c. Safety Engineer shall be responsible for all work safety on the site throughout the duration of the work. The Contractor has sole responsibility for maintaining a safe and secure work site, how they achieve the security and safety of the workers and property is at their discretion. However, at a minimum the Owner expects the Safety Engineer to visit the site once a week and during high risk activities and at intervals as identified in the contract documents. Safety Engineer shall document his/her visits and reflect any issues or findings within such report. Reports shall be available within 24 hours of the inspection. Project Engineer (Project specific)

3. Each individual listed above shall have not less than five (5) years' experience performing work of a similar nature to this project and in a comparable position to the position assigned on this project. Resumes will be required on all key personnel prior to acceptance by the Owner. Any Contractor personnel denoted as Key Personnel that were previously accepted by the Owner, shall not be removed from the project without Owner's prior approval.
4. Each individual listed or identified at a later date shall have a background check performed as outlined in the University's Contractor Background Checks Policy that can be viewed at the following weblink: http://updc.uconn.edu.

C. Contractor's Background Screenings: Provide Contractor's Background Screening Control Plan on how the Background Screenings will be performed and how the workers will be tracked to ensure that Background screenings are to be performed and reviewed prior to allowing any worker to access the project site. See Section 01 3300 Submittal Procedures and Section 01 5000 Project Management and Coordination for additional requirements on Contractor background screening.

1.5 GENERAL COORDINATION PROCEDURES

A. Permits: The Owner shall provide the initial building permit for the project. The local Public Safety shall have jurisdiction with non-threshold buildings, for inspection work. However, in cases where a building is a threshold building or is being demolished, the Contractor is responsible for coordinating, obtaining and paying for required permits.

B. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in 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. At a minimum, weekly inspections of project by the safety officer are required. Safety inspector reports shall be made available at the Owner's request within (24) hours.
3. Inspections of the project by the official(s) having jurisdiction at intervals required by the respective general permit requirements. Regardless as to who applied for a permit, the Contractor is responsible to comply and perform all requirements associated with any permit issued against the Project.

    a. http://publicsafety.uconn.edu/fmbio/
    b. Operating permit
    c. Health and Safety permit
    d. Environmental permit(s)

4. The Contractor is responsible to abide by the terms of all Environmental Permit requirements including but not limited to:

    a. Flood Management Permit (when applicable)
    b. Construction Stormwater General Permit (when applicable)
    c. Inland Wetlands and Water Resource Permit (when applicable)
        i. Turbidity testing and reporting
    d. New Source Review permit (when applicable)
    e. Waste Water Discharge permit (when applicable)
    f. Environmental Title V Air permit (when applicable)

5. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
6. Coordinate demolition of different components to ensure maximum performance and safety.

a. Upon immediate demolition, cap the ends of the pipes to contain the off gases coming from within the pipe to eliminate potential false gas leak reports and ensure safety to other areas not being impacted.

7. Make adequate provisions to accommodate items scheduled for later installation.

C. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Listing, delivery and processing of submittals.
5. Project meetings
6. Progress meetings.
7. Project closeout activities.
8. Startup and adjustment of systems.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: **PRIOR TO START OF WORK ACTIVITY:** Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data or Engineers electronic data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Coordination Drawings Review: Engineer will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Engineer determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Engineer will so inform Contractor, who shall make changes as directed and resubmit.

    a. Contractor shall not rely on the availability of BIM for use in Contractor’s coordination.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified and sent directly to the Engineer.

1. Engineer will return RFIs submitted to Engineer by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
3. Habitual submissions of RFI’s not having any serious purpose and/or having no sound basis and/or is consistently incomplete and/or is already answered within the Contract documents, the Contractor shall reimburse the Owner for the Engineer’s additional time reviewing and answering such RFIs.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Engineer.
6. RFI number, numbered sequentially.

7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716 or similar and in a form acceptable to the Owner and Engineer.

1. Attachments shall be electronic files in Adobe Pro PDF format.

D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven (7) days for Engineer's response for each RFI. RFIs received by Engineer after 3:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Engineer's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.
3. Engineer's action on RFIs is not intended to change the Contract Time or the Contract Sum.

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer and Owner in writing within seven (7) days of receipt of the RFI response with a proposed order of magnitude cost.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly or as directed in a format acceptable to the Engineer and Owner. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Engineer.

4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Engineer's response was received.

F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven (7) days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. Preconstruction Conference: The successful bidder shall attend a preconstruction conference and organizational meeting at the Owner's Office of Planning, Architectural and Engineering Services, with the Owner prior to any field work to review responsibilities and personnel assignments and to insure that Specifications, drawings and all conditions are understood to properly complete this Contract.

1. The meeting will be scheduled by the Owner's Representative.
2. Attendees: The Owner, authorities having jurisdiction, Environmental Health and Safety Representative, Parking Services Representative, Environmental Compliance representative, Commissioning Agent, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties may attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including but not limited to the following where applicable:
4. Contractor shall have the following prepared and ready for review at the pre-construction meeting:

a. Emergency / Point of Contact Information: Point of contact shall be persons whom are directly employed by the Contractor who are designated to be available 24/7 for the duration of the project. Such person(s) shall be accessible and responsive as required within the University's Contractors Environmental Health and Safety Manual. Such responsiveness shall also include but not be limited to remedies to the perimeter construction fence and security breaches to the project site.
b. Contractor's Health and Safety Plan specific to the project: Prior to, and as a

i. Condition of mobilization on site, the Contractor shall submit a Safety Plan consisting of no less than the following information: Material Safety Data Sheets for all potentially harmful substances.
ii. A list of Contractor, Subcontractor, and Owner personnel to be notified in the event of an emergency.

iii. A list of Contractor's personnel to be notified by the Owner in the event of an emergency during "off" hours.
iv. Evacuation Plans.
v. Emergency medical procedures.
vi. Locations of emergency medical equipment.
vii. Completed Contractor Receipt Acknowledgement Form from the last page of the University of Connecticut, Contractor EHS Manual (http://www.ehs.uconn.edu/ppp/Contractor_EHS_Manual.pdf)
viii. Executed Confined Space as required by the Owner's EHS manual. Utilize provided forms.

c. Contractor's Quality control plan specific to the project.
d. Copy of the transmittal letter of the project specific Affirmative Action Plan submission to CHRO and CPCA. Transmittal must reflect the project name and number and date transmitted.
e. Detailed CPM Construction Schedule specific to the project.
f. List of Certification Submittals required by the contract documents

i. Telecommunication technician certifications (where applicable)
ii. Millwork certification (where applicable)
iii. Contract Arborist (where applicable)

g. Any proposed Changes to the Site Logistics Plan
h. Erosion Control Plan
i. Background Screening Control Plan (where applicable)
j. Items for discussion not limited to:

i. Contractor's CPM Construction schedule.
ii. Phasing.
iii. Logistics Plan review.
iv. Critical work sequencing and long-lead items.
v. Labor Market Regulations.
vi. Designation of key personnel and their duties.
vii. Lines of communications and emergency phone numbers.
viii. Background Check Plan review, where applicable.
ix. Procedures for processing field decisions and potential Change Orders.
x. Procedures for RFIs.
xi. Procedures for testing and inspecting.
xii. Procedures for processing Applications for Payment.
xiii. Distribution of the Contract Documents and correspondence.
xiv. Submittal procedures.
xv. Retain first subparagraph below for projects with LEED or other sustainable design documentation requirements. Delete below if separate LEED coordination conference is required.
xvi. Sustainable design requirements.
xvii. Preparation of record documents.
xviii. Use of the premises, including dust and noise control.
xix. Parking and parking permits, see contractor parking policy http://policy.uconn.edu/2016/02/04/contractor-parking-policy/

xx. Work restrictions including working hours.
xxi. Owner's occupancy requirements.
xxii. Responsibility for temporary facilities and controls.
xxiii. Procedures for disruptions and shutdowns.
xxiv. Construction waste management and recycling.
xxv. Office, work, and storage areas.
xxvi. Equipment deliveries and priorities.
xxvii. Owner's Vendor Code of Conduct Policy: http://policy.uconn.edu/2013/02/12/vendor-code-of-conduct/
xxviii. Security.
xxix. Progress cleaning.
xxx. Owner's Contractor Environmental Health and Safety Manual, Safety procedures, including the Owner's Hazard Communication Program and policies on pest control, asbestos, lead-based paints, lockout/tagout procedures, excavation and trenching, disposal of PCB containing light ballasts, use of solvents, solvent or epoxy based paints, confined space entries and use of open flames.

5. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

B. Project Meeting: The Contractor shall schedule and conduct meetings and conferences at Project site unless otherwise indicated. Project Meetings shall at a minimum be performed bi-weekly.

1. Attendees: Coordinate with the Owner and Engineer a set day and time for the project meetings. Identify in collaboration with the Owner and Engineer any other key individuals whose presence is required. This meeting is not intended to be inclusive with any Pre-installation Conference or Progress Meeting requirements. List all required attendees.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees at least two working days prior to the scheduled meeting. Discuss items of significance that could affect progress, including but not limited to the following:

a. Review of the previous meeting minutes. Record corrections and any agreements/disagreements
b. Progress of the work.
c. Compare construction progress with the Project's approved Construction Schedule.

i. Review progress since the last meeting.
ii. Identify activities on the critical path that are ahead of schedule, or behind schedule, in relation to the contractually accepted construction schedule.
iii. Provide recovery steps on how construction behind schedule will be brought back into schedule.
iv. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

d. Review Contractor's site safety reports.
e. Review any critical work sequencing and long-lead items.
f. Review sustainable design/LEED requirements.

g. Review of any management or supervisory responsibilities:

i. Contractor conduct.
ii. Staffing / Man Power.
iii. Protection of construction personnel and adjacent sites.
iv. Dust and noise control.
v. Progress cleaning.
vi. Temporary facilities and controls.
vii. Moisture and mold control.
viii. Construction waste management and recycling.
ix. Unacceptable behavior.
x. Security
xi. Hazard Communication Program

h. Review of Submittal log.
i. Review of RFI log.
j. Review of proposed change order (PCO) log.
k. Review of Change Order log.
l. Review any labor or wage issues.
m. Review any Payment issues.
n. Review the next two weeks look ahead schedule.

i. Identify any testing and inspections to be performed.
ii. Any work restrictions including working hours.
iii. Scheduling of disruptions and shutdowns
iv. Equipment deliveries and priorities.

o. Review any other critical issues.

3. Minutes: Entity responsible for conducting meeting will clearly identify themselves as the author of the minutes, record and distribute meeting minutes. The meeting will record significant discussions and agreements achieved. With each meeting held, minutes shall reflect the author, all invited attendees, any additional attendees who attended the meeting and those invited attendees that did not attend the meeting. Distribute the meeting minutes to everyone concerned for review, including but not limited to Owner and Engineer, within three (3) days of the meeting.
4. Minutes from the previous meeting shall be reviewed at the start of each subsequent meeting. Document any clarifications, corrections, or exceptions to the contents of the minutes and identify the attendee requesting the adjustments. Resolve any disagreements that may arise with the contents and document accordingly and document within the minutes. Minutes shall not require acceptance prior to the next scheduled meeting, unless the project has reached final completion and final payment is in process.

C. Pre-installation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: 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. Advise Engineer and Owner of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including but not limited to requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals, shop drawings, product data, and quality control samples.
    h. Sustainable design requirements.
    i. Review of mockups.
    j. Possible conflicts.
    k. Compatibility requirements.
    l. Time schedules.
    m. Weather limitations.
    n. Manufacturer's written instructions.
    o. Warranty requirements.
    p. Compatibility of materials.
    q. Acceptability of substrates.
    r. Temporary facilities and controls.
    s. Space and access limitations.
    t. Safety.
    u. Regulations of authorities having jurisdiction.
    v. Testing and inspecting requirements.
    w. Installation procedures.
    x. Coordination with other work.
    y. Required performance results.
    z. Protection of adjacent work.
    aa. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Entity responsible for conducting meeting will record and distribute meeting minutes. Meeting minutes shall identify who the author is and date the meeting was held. Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings with Contractor’s subcontractors at the Project Site at regularly (minimum bi-weekly) scheduled intervals. Contractor shall:

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or accept minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction activities behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        i. Review schedule for next period.

    b. Review present and future needs of each entity present, including but not limited to the following:

        i. Interface requirements.
        ii. Sequence of operations.
        iii. Status of submittals.
        iv. Status of stainable design documentation, if required.
        v. Deliveries.
        vi. Off-site fabrication problems.
        vii. Access.
        viii. Site utilization.
        ix. Temporary facilities and controls.
        x. Progress cleaning.
        xi. Quality and work standards.
        xii. Status of correction of deficient items.
        xiii. Field observations.
        xiv. Status of RFIs.
        xv. Status of proposal requests.
        xvi. Pending changes.
        xvii. Status of Change Orders.
        xviii. Pending claims and disputes.
        xix. Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information. Meeting minutes shall identify who the author is and the date the meeting was held. Contractor shall distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report. Submit report no later than 3 days after each progress meeting date.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule to recover have been discussed. Issue revised schedule concurrently with the report of each meeting.

E. Coordination Meetings: Conduct Project coordination meetings at regular intervals convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: Every party currently involved in coordination or planning for the construction activities involved. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting. Meeting minutes shall identify who the author is and the date the meeting was held.

F. Landscape Status Updates: Contractor shall require and receive regular written status updates from his landscape sub-contractor(s) on portions of the work the subcontractor is performing. Contractor shall distribute status updates to the Owner.

1.9 GENERAL ADMINISTRATION

A. Call Before You Dig (CBYD): Contractor is responsible to monitor the conditions of the markings and maintain their appearance throughout the duration necessary to complete the work associated with the markings. At the time of Substantial Completion, the Contractor is responsible for the complete removal of all CBYD markings required for the project that is applied to any hard surface.

B. GIS Surveying: Contractor is responsible for documenting field conditions and new installation using coordinates mapping, Contractor is responsible for ensuring that any flags or markings used in establishing the mapping are removed at the completion of the survey work for the day. Contractor shall immediately have removed any flags or markings that are no longer needed.

C. Contractor shall comply to the requirements outlined within CGS Sec. 4e-70 relating to confidential information,

D. Contractor and Subcontractor Information:

1. Before the first application for payment, provide a list of all known Contractors, Subcontractors and Suppliers who are intended to be working on or supplying material and equipment to the project for review and acceptance by the Owner.
2. List shall include key information about the Contractor and subcontracts assigned under this Project in a format acceptable to the Owner. Please refer to the format template located at the following weblink. http://updc.uconn.edu/

a. Identify if the business is a nonresident business, are they verified or unverified by the State of Connecticut Department of Revenue Services pursuant to Conn. Gen. Stat. §12-430 and follow all requirements associated.

b. Such list shall be updated and resubmitted with each month's application for payment pencil draft.

E. Application for Payment Procedures:

1. Contractor shall submit for review within 30 days of contract signing, a project specific schedule of values for payment. Schedule of values are to represent at a minimum the following (as applicable) and shall have a value associated with each element:

a. General Conditions:

i. Bond Costs (actual)
ii. Project and Administrative Management
iii. Supervisory and Daily Site Record keeping
iv. Safety Management
v. Site Trailer and associated general site operational expenses
vi. Temporary Fencing – Site Logistics
vii. Security Management
viii. Coordination Documents – assigned value shall be no less than 25 % of total general conditions value. Payment shall be made based on full complete coordination of systems within the documents.
ix. Closeout Documents – assigned value shall be no less than 30 % of total general conditions value.

b. List of CSI Division sections identified within the contract documents, broken down by:

i. Labor
ii. Material
iii. Equipment (large value pieces and/or systems
iv. If the project requires work to be performed in phases, breakdown by phase and then by General Conditions and by CSI Divisions.
v. If the project work entails multiple floors/stories, breakdown by floor and then by CSI Divisions.

c. List only those Change Orders that have been fully executed by all parties.

i. Include with the CO listing any CCD that was issued in support of the Change Order.

d. Do not list PCO's within the schedule of values.
e. Only those change orders that have been fully executed by all parties shall be listed and allowed to be a part of the month's billing. Should the Contractor list a change order prior to full execution and receipt back, regardless if the application has been certified by the Engineer, the Owner shall not be responsible for any delays in payment and shall have the right to reject the application and ask for a resubmission with removal of any change orders as deemed warranted.

2. Attachments to the Application for Payment for processing:

    a. Pencil Draft

        i. Copy of email sent to designated UPDC email address submitting report and payroll in support of previous months' work.
        ii. Copy of certified summary cover sheet Worker Distribution Report.

            a) If summary page of the report is not signed by the Contractor, payment shall not be processed.

        iii. Copy of transmittal to CHRO in support of submitting updates to the Contractor's affirmative action plan.
        iv. Subcontractor list updated in the format required by the Owner.

    b. First Application for payment

        i. List of Subcontractors and Suppliers in the format outlined by the Owner.
        ii. Formal submission to the Owner for review and approval, Contractor and subcontractors (where applicable) list of company owned equipment in the format outlined in Section 2600 Contract Modifications.
        iii. Formal submission to the Owner for review and approval, Contractor and subcontractor Labor Rates.

3. Certified Payroll: Pursuant to CGS Sec. 31-53, original certified payrolls with a statement of compliance shall be submitted.
4. On a monthly basis, all certified payrolls for the project shall be received from their subcontractors by the Contractor. The Contractor is responsible to track, monitor and report for compliance with the Department of Labor and Owner requirements.

    a. Documents are to be submitted in the format acceptable to the Connecticut Department of Labor.
    b. Verify all certified payrolls are being received from all subcontractors and sub-tier subcontractors performing work on the project for the period of time being reported.
    c. Confirm payroll information has been included not limited to paycheck number.
    d. Ensure each payroll reporting is filled out completely even if the worker is the "owner" of the company performing the work. Reporting as owner performance with no payment information is not in conformance with CTDOL requirements.
    e. Verify that the Subcontractor has a current compliant Connecticut Worker's Compensation policy.

        i. Obtain the subcontractor's workers compensation policy.
        ii. Policies that state "Interstate' do not meet the statutory requirements.

    f. Verify the appropriate Agent for the Subcontractor submitting the payroll has certified each of them.

g. Obtain and verify current OSHA 10 certifications for any all workers who performed on the project. Include a copy of each workers OSHA 10 certification, when first reporting them on certified payrolls.
h. Ensure all certified payrolls for the month have been received for work performed by the various subcontractors and sub-tiers, inclusive of all weeks within the month **worked or not worked.**
i. Ensure that the last required submission of certified payrolls are identified as the "Final" submission.
j. Utilize the Worker Geographic Report data template and record each weekly Certified Payroll submission from each subcontractor for work performed or not under the project for that particular week. Record alphabetically.
k. Refer to the following weblink for the most current acceptable format template: **http://updc.uconn.edu**

5. Contractor shall submit all certified payrolls (including their own) and supporting documents to the Owner in the following manner:

a. Submit electronically to: **UPDCcertifiedpayroll@uconn.edu**
b. Submit monthly at the same time as when the pencil draft of the application for payment is submitted for approval.
c. Provide in the Subject line of the email the following information in the order represented:

i. Project #
ii. Contractor Name
iii. Period Reporting On

Example: 901211 Turner April 2016 Certified Payrolls

d. Organize the documents in the following manner prior to uploading the document into the email:

i. Contractor's Worker Geographic Distribution Report
ii. Contractor's certified payrolls with each week of the month in sequential order
iii. Subcontractors certified payrolls organized alphabetically by subcontractor and then within each subcontractor submission, lastly by each sequential week of the month being reported;
iv. Ensure that each side of a payroll page (if double sided) has been scanned to include their certification for that payroll reporting;
v. In the body of the email, identify any non-compliance issues relating to the payrolls being reported on to the Owner.

6. Failure to consistently submit complete complying certified payrolls to the Owner in the format outlined, any costs incurred by the Owner to perform the requirements, shall be a reimbursement from the Contractor to the Owner.
7. Worker Geographic Distribution Report (Report): Following the close of each consecutive month's certified payrolls and in conjunction with the certified payroll submission, the Contractor who is directly contracted with the Owner shall submit a

project specific Worker Geographic Distribution Report on all workers who performed work on the project for the period of time represented on the report.

a. For the purposes of this reporting, the following terms shall have the meaning as assigned.

i. "Covered Project" is a project that is subject to Section 31-53(a) of the Connecticut General Statutes.
ii. "Monthly" means a calendar month of each calendar year.
iii. "Residence" is the state in which a Worker resides, as reflected in the payroll records of such Worker's employer.
iv. "Subcontractor" is any subcontractor or sub-subcontractor of the Contractor, which subcontractor or sub-subcontractor employs Workers on the Project.
v. "Wages" are the wages that are subject to Section 31-53(a) of the Connecticut General Statutes (including any amounts paid to an employee welfare fund).
vi. "Worker" is an employee of the Contractor or a Subcontractor (as defined hereinabove), which employee is working on the Project and whose wages for such work is subject to Section 31-53(a) of the Connecticut General Statutes.

b. The monthly Worker Geographic Distribution Report shall summarize and include all Contractor and subcontractors' worker data information provided in a format required by the Owner.

i. The numbers of hours of Project work for which such Worker was paid during such month reporting.
ii. The Wages (as defined hereinafter) paid to such Worker during such month's reporting.
iii. The State of residence for such Workers being reported as of the close of such month's reporting.
iv. The reporting shall not contain any personally identifiable information about a worker.
v. Certified payrolls applicable shall accompany the monthly reporting.
vi. Owner format shall be used and not altered in any way without explicit approval from the Owner. Refer to the following weblink for the most current acceptable format template: http://updc.uconn.edu
vii. Failure to submit Worker Geographic Distribution Report in the format required, any costs the Owner incurs to perform the requirements outlined shall be reimbursed by the Contractor.

c. Such report shall be updated and resubmitted monthly with the submission of each month's application for payment as a condition of release of payment.

F. CHRO Reporting: Submit to the Commission on Human Rights and Opportunities (CHRO) on a monthly basis their Small Contractor/Minority Business Enterprise Utilization, Payment Status and Materials Consumption Reports (i.e., Form CHRO cc-257, cc-257a, cc-257b, cc-258a and

cc-259). ORIGINAL reports shall be sent by the 25th day following the end of each calendar month to:

Commission on Human Rights and Opportunities (CHRO)
25 Sigourney Street, 7th Floor
Hartford, CT 06106

1. Provide a copy of the transmittal sent to CHRO to the following Owner contact: veronica.cook@uconn.edu.

2. Do not send any CHRO reports with the certified payroll or to anyone else other than those identified, unless otherwise directed by the Owner. Upon request, the Contractor shall provide documentation to the Owner of compliance with small business and minority business enterprise contracting goals.

G. Contractor's Background Screenings

1. Prior to, and as a condition of mobilization on site, the Contractor shall submit a Background Screening Control Plan process on each worker for each project regardless of past screenings and shall be consistent with the requirements of the University's Capital Project's Background Screening Guidelines. The University's Capital Project's Background Screening Guidelines can be found: http://updc.uconn.edu

   a. Identify the background screening company who will be conducting the screenings for all workers under this project. And the process they will be using to perform the screenings.
   b. Identify how the Contractor will control access to the Construction Site to restrict non-screened or non-approved workers from entering the work site and performing work.

2. Provide a report monthly listing all workers who have been approved for work, disqualified for work and who are pending review.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS 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. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Project Milestone Construction schedule.
2. Contractor’s CPM schedule
3. Construction CPM schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.
8. GIS Mapping of existing and new conditions

B. Related Requirements:

1. Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.
2. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
3. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. 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 Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Owner.

C. Milestone: An action or event marking a significant stage or stages in the life of a construction project. Significant milestones may include but not limited to (where applicable):

1. Projected start date. Provide sufficient time for the Owner and Contractor to execute the contract.
2. Pre-Construction Meeting
3. Critical and non-critical Submittal submissions and approvals (provide sufficient time for reviews as outlined in the contract)
4. Mobilization with temporary fencing system and project signage installation.
5. Construction start date
6. Site work start date
7. Demolition start date
8. Demolition completion date
9. Site work completion date
10. Utilities upgrades start date (each)
11. Utilities shutdown / tie-ins (each)
12. Utilities upgrades completion date (each)
13. Structural Foundations start date
14. Structural Foundations completion date
15. Elevator Shaft start date
16. Elevator Shaft completion date
17. Building Core start date
18. Building Core completion date
19. Skeleton Framing completion date
20. Façade installation start date
21. Façade installation completion date
22. Roof framing completion date
23. Window installation start date
24. Window installation completion date
25. Water Tight Building date
26. Mechanical infrastructure start date
27. Plumbing infrastructure start date
28. Electrical infrastructure start date
29. Interior framing start date
30. Interior wall enclosure start date
31. Interior wall enclosure completion date
32. Ceiling installation start date
33. Ceiling installation completion date
34. Finish installation start date
35. Substantial Completion
36. Final Completion

D. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

E. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

F. Event: The starting or ending point of an activity.

1. Float: The measure of leeway in starting and completing an activity. The excess time included in a construction schedule to accommodate such items as severe unusual inclement weather and associated delays, equipment failures, and other such unscheduled events. It is the contingency time associated with a path or chain of activities and represents the amount of time by which the early finish date of an activity may be delayed without impacting the critical path and delaying the overall completion of the Project. Any difference in time between the Contractors' approved early completion date and the Contract Completion Date shall be considered a part of the Project float. Float time belongs to both the Owner.Free Float: The time (in days) by which an activity may be delayed or lengthened without adversely impacting upon the early start day of any activity following in the chain.

2. Total Float: The difference (in days) between the maximum time available within which to perform an activity and the duration of an activity. It represents the time by which an activity may be delayed or lengthened without impacting the Time for Completion or the Contract Completion Date.

3. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required schedule submittals in the following format:

1. Working electronic copy of construction schedule file, as indicated.
2. Acceptable software:

a. Microsoft office for small uncomplicated projects as determined by the Owner.
b. Primavera 6 for large more complicated projects as determined by the Owner

3. Format submission

a. In the format detail as required of the particular schedule requirements
b. Software as determined by the Owner.
c. PDF (ADOBE PRO) electronic file.
d. Three (3) paper copies.

B. Contractor's Project Milestone Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Milestone schedule shall be submitted upon receipt of Letter of Intent as a condition to award and shall be in a size required to display a readable schedule for entire construction period. Document page size shall not exceed 8.5x11 and is not limited to a single page.
2. Submit an electronic copy of schedule, using software acceptable to the Owner, and labeled to comply with requirements for submittals.

3. Contractually accepted Contractor's Project Milestone Construction schedule shall not be altered from what was initially accepted. Contractor's Project Milestone Construction schedule can only be adjusted by fully executed change order.

C. Contractor's CPM Schedule: Subsequent schedule that details all activities associated with the work. The Contractor's CPM schedule represents the Contractor's plan for achieving the contractual completion of the project. Updates to and the submission of the Contractor's CPM schedule shall not represent acceptance by the Owner and/or Engineer.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
5. Resource Loading Report: List all activities initial resource loadings as compared to actual for the month.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at monthly application for payment intervals.

G. Material Location Reports: Submit at monthly application for payment intervals.

H. Geographic Distribution Reports: Submit at monthly application for payment intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Special Reports: Submit at time of unusual event.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate Owner's contractors and/or Contractor's subcontractors.

B. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.

2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to the date required for Substantial Completion.

1. Anticipated Notice to Proceed date: For purposes in establishing the start date of the project schedule, represent the start date as an additional seven (7) days beyond the time allotted within the letter of intent for required documents to be submitted by the Contractor to the Owner for contract execution. Should the time anticipated for the project start date be exceeded due to Contractor's failure to provide accurate timely documents and/or availability to fully execute the contract, Contractor shall not be entitled to an extension to the date outlined for Substantial Completion. Should the time anticipated for the project start date be exceeded due to Owner's failure to provide accurate timely documents and/or availability to fully execute the contract, the Contractor shall be entitled to an extension to the date outlined for Substantial Completion equal to the days taken by the Owner to issue a Notice to Proceed. Such extension shall not be compensable.
2. Substantial Completion date shall not be changed for reasons not caused by the Owner. Should the time allotted within the letter of intent for contract required documents to be submitted by the Contractor, be exceeded due to Contractors failure to provide such accurate timely documents within the time frame identified the Contractor shall not be entitled to an extension to the date outlined for Substantial Completion.
3. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Revise "Activity Duration" Subparagraph below to suit Project. Long activity durations provide less detail and, therefore, less information with which to manage a project. As an alternative to specifying activity duration, indicate minimum and maximum number of activities, which will result in a similar effect.
2. Activity Duration: Define activities so no activity is longer than twenty (20) days, unless specifically allowed by the Owner.
3. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than sixty (60) days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
4. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
5. Startup and Testing Time: Include no fewer than fifteen (15) days for startup and testing.

6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow a minimum of fifteen (15) days for Engineer's administrative procedures necessary for Punch List and certification of Substantial Completion.
7. Punch List and Final Completion: Include not more than thirty (30) days for completion of punch list items and final completion.

C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Utility interruptions, Substantial Completion, and Final Completion.

D. Two Week Look ahead schedule: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

E. Recovery Schedule: When periodic update indicates the Work is behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

F. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. CPM Schedule: Prepare Contractor's construction schedule of sufficient detail to indicate all significant construction activities. The level of detail should be such that no activity should exceed twenty (20) days. Where similar activities continue beyond the twenty (20) day limit, these activities should be broken into subgroups, specific areas, or phases so that the twenty (20) day maximum duration is maintained.

1. Develop network diagram in sufficient time to submit CPM schedule for review no later than twenty (20) calendar days after date established of contract execution.

   a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Owner's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

3. Subparagraph below coordinates between working days of time and calendar days. Under AIA Document A201, the Contract Time is in calendar days.
4. Use "one calendar day" as the unit of time for individual activities. Indicate nonworking days, restricted days as outlined in Section 01-1000 Summary and holidays incorporated into the schedule in order to coordinate with the Contract Time.

B. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

   a. Date of Notice to Proceed
   b. Preparation and processing of submittals.
   c. Mobilization and demobilization.
   d. Purchase of materials.
   e. Delivery.
   f. Fabrication.
   g. Utility interruptions.
   h. Installation.
   i. Special Equipment
   j. Testing.
   k. Commissioning
   l. Telecommunications installations
   m. Furniture installations (where applicable) and Owner installations
   n. Punch list and final completion.
   o. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

   a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. Day of the week, date and the time of day the report is filled out.
2. List of subcontractors at Project site.
3. List of separate contractors at Project site.
4. Approximate count of personnel by subcontractor and trade labor work being performed at Project site.
5. Separately document any and all change order work being performed, the subcontractor/contractor performing and number of personnel. Obtain and confirm work performed, manpower trade category and hours worked against additional work tickets of the subcontractor or Contractor.
6. Construction equipment at Project site.
7. Material deliveries and confirmation receipts of quantities delivered.
8. Materials and Equipment not yet incorporated into the work yet stored at the Project site.
9. High and low temperatures and general weather conditions, including presence of rain or snow.
10. Accidents.
11. Meetings and significant decisions.
12. Unusual events (see special reports).
13. Stoppages, delays, shortages, and losses.
14. Meter readings and similar recordings.
15. Emergency procedures.
16. Orders and requests of authorities having jurisdiction.
17. Daily additional work tickets
18. Photographs taken
19. Services connected and disconnected.
20. Equipment or system tests and startups.
21. Partial completions and occupancies.
22. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

D. Daily Additional Work Tickets: Prepare daily additional work tickets recording the following information for a change in the work issued by a CCD. Tickets shall be documented separately for each trade labor category being performed that day and shall reflect at a minimum the following:

1. Date and day of the week
2. Change work being performed and percentage progress
3. Number of workers working on the change consistently and their respective work labor category.
4. Number of hours worked working on the change consistently per trade labor category.
5. Materials delivered and used specifically for the change work.
6. Equipment delivered and/or used specifically and consistently for the change work. If equipment already exists on site and is used to perform the change work, number of hours the equipment is used shall be documented.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one (1) day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

2.5 GIS Mapping: When the subsurface is open and there are existing and new utilities and any abandon piping/ductbanks conditions exposed, Contractor is responsible for subcontracting with a surveyor proficient in GIS mapping to collect the metadata as outlined by the Owner of the utilities or abandon piping/ductbanks before back filling. Should Contractor fail to properly survey the conditions, at the Contractors cost, they shall open up the subsurface so that such conditions can be properly documented as outlined.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's CPM Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled project and progress meetings.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated two week look ahead schedule concurrently with the report of each such meeting. In the event the updated Schedule exceeds the Construction Completion date recognized in the contract, the Contractor must accompany the update with a recovery schedule.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of the updated schedule to Engineer, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules 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 performance of construction activities.

END OF SECTION 013200

SECTION 013300 - 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. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals, including;

1. Contractor’s construction schedule
2. Submittal schedule
3. Shop Drawings
4. Coordination Drawings and Layout
5. Daily Construction Reports
6. Product Data
7. Samples
8. Site Mobilization Plan
9. Safety Plan
10. Background Screenings

B. Related Requirements:

1. AIA Document A101 Contract Article 5 "Payments" for submitting Applications for Payment and the schedule of values.
2. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. Portable Document Format (PDF-Adobe Pro): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 30-60 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.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's CPM construction schedule which is due within twenty (20) days from contract execution.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Project Name and Project Number
    b. Scheduled date for first submittal.
    c. Specification Section number and title.
    d. Submittal category: Action; informational.
    e. Name of subcontractor.
    f. Scheduled date for Engineer's final release or approval.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. 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.

    a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow time for any submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt, Commissioning Agent's receipt and Official having jurisdiction 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.

1. Initial Review: Allow fourteen (14) days from receipt for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow fourteen (14) days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Engineer's consultants, Owner, or other parties is indicated, allow twenty-one (21) days for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Engineer and to Engineer's consultants, allow fourteen (14) days for review of each submittal. Submittal will be returned to Engineer before being returned to Contractor.

C. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Engineer.
    d. Name of Contractor.
    e. Name of subcontractor.
    f. Name of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Owner.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return without review submittals received from sources other than Contractor.

a. Transmittal Form for Paper Submittals: Use AIA Document G810 or similar format.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating paper submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.R1).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.

4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:

a. Project name.
b. Date.
c. Name and address of Engineer.
d. Name of Contractor.
e. Names of subcontractor, manufacturer, and supplier.

f. Category and type of submittal.
g. Specification Section number and title.
h. Related physical samples submitted directly.
i. Indication of full or partial submittal.
j. Transmittal number.
k. Submittal and transmittal distribution record.
l. Remarks.

E. Options: Identify options requiring selection by Engineer.

F. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. Transmit each submittal from Contractor to Owner using a transmittal form.

1. Submit electronic submittals as PDF-Adobe Pro electronic files.

a. Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Action Submittals: Submit five (5) paper copies of each submittal unless otherwise indicated. Engineer will coordinate reviews and incorporate comments received from officials having jurisdiction and return four (4) copies, one to Owner, two to Contractor and one to the official having jurisdiction.

3. Informational Submittals: Submit five (5) paper copies of each submittal unless otherwise indicated. Engineer will not return copies.

4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Notation of coordination requirements.

4. For equipment, include the following in addition to the above, as applicable:

    a. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

    a. Four (4) paper copies of Product Data unless otherwise indicated. Owner will retain one (1) copy and Engineer will retain one (1) copy; remainder will be returned.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.

e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. 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 30 by 42 inches.
3. Submit Shop Drawings in the following format:

a. If five (5) opaque copies of each submittal. Owner will retain one (1) copy, official having jurisdiction will retain one (1) copy and Engineer will retain two (2) copies; remainder will be returned.

D. Samples: Submit physical Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal in addition to physical Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of

color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; mock-ups, swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three (3) sets of Samples. Engineer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.

E. Coordination Drawing Submittals: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

G. Application for Payment and Schedule of Values: Comply with requirements specified in Division 00 Section "Payment Procedures."

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."

J. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

K. Site Mobilization / Logistics Plan

1. Prior to the start of operations on the site, the Contractor shall submit to the Owner, a Site Mobilization Logistics Plan which shall indicate pertinent dates and times, logistics, construction fence, laydown area, traffic flow and compliance with the General Requirements to a level of detail commensurate with the complexity of the construction and the sensitivity of the Owner’s ongoing activities on site.

L. Safety Plan

1. Prior to, and as a condition of mobilization on site, the Contractor shall submit a Safety Plan consisting of no less that the following information:

a. Material Safety Data Sheets for all potentially harmful substances.
b. A list of Contractor, Subcontractor, and Owner personnel to be notified in the event of an emergency.
c. A list of Contractor's personnel to be notified by the Owner in the event of an emergency during "off" hours.
d. Evacuation Plans.
e. Emergency medical procedures.
f. Locations of emergency medical equipment.
g. Completed Contactor Receipt Acknowledgement Form from the last page of the University of Connecticut, Contractor EHS Manual (http://www.ehs.uconn.edu/ppp/Contractor_EHS_Manual.pdf)

M. Contractor's Background Screenings

1. Prior to, and as a condition of mobilization on site, the Contractor shall submit a Background Screening Control Plan process on each worker for each project regardless of past screenings and shall be consistent with the requirements of the University's Capital Project's Background Screening Guidelines. The University's Capital Project's Background Screening Guidelines can be found: http://paes.uconn.edu/Contractors.html

a. Identify the background screening company who will be conducting the screenings for all workers under this project. And the process they will be using to perform the screenings.
b. Identify how the Contractor will control access to the Construction Site to restrict non-screened or non-approved workers from entering the work site and performing work.

2. Provide a report monthly listing all workers who have been approved for work, disqualified for work and who are pending review.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, design loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer. Project Closeout and Maintenance Material Submittals: See requirements in Division 01 Section "Closeout Procedures."

Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review. Any re-review of any one submittal beyond two reviews by the Engineer (not a direct cause by the Engineer), costs associated for their continued review(s) shall be at the Contractor’s expense.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S ACTION

A. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return the submittal to contractor, Owner will receive final approved submittal from the Engineer. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Engineer without action.

END OF SECTION 013300

SECTION 014000 - QUALITY 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. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -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 tests, inspections, and related actions do not limit Contractor's other quality-assurance and control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and control services required by Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Requirements:

1. Division 01 Section "Allowances" for testing and inspecting allowances.
2. Divisions 01 section Close out
3. Divisions 02 through 26 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. 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 requirements. Refer uncertainties to Engineer for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Engineer.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Engineer.
3. Any other delegated design work required within the contract documents.

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit project specific quality-control plan within ten (10) days of Notice to Proceed, and not less than five (5) days prior to preconstruction conference. Submit in format acceptable to Owner. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Certification that conditions, products, and installation will satisfy all aspects of the warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Certification that conditions, products, and installation will satisfy all aspects of the warranty
5. Other required items indicated in individual Specification Sections.

1.8 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced and certified in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed

for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Mockups: 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 Engineer.
2. Notify Engineer seven (7) days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Engineer's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven (7) days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed unless otherwise indicated.

K. Integrated Exterior Mockups: Construct integrated exterior mockup as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

1.9 QUALITY CONTROL

A. Owner Responsibilities: The Owner will provide independent inspections, tests, and similar quality control services specified to be performed by independent agencies and not by the contractor, except where they are specifically indicated as the contractor's responsibility or are provided by another identified entity. Costs for these services are not included in the Contract Sum.

1. The Owner will employ and pay for services of an independent agency and furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor**,** and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify the Owner and testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Owner, Engineer**,** and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owners Representative, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner**,** as indicated in Statement of Special Inspections attached to this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Engineer.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Owner and Engineer's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

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. Section includes requirements for temporary services and facilities, including:

1. Utilities
2. Temporary construction
3. Construction aids
4. Barriers and enclosures
5. Security
6. Access roads
7. Temporary controls
8. Traffic control
9. Project identification signs and banners
10. Site Logistics
11. Field offices and sheds
12. Temporary use of Roads and Campus grounds
13. Maintenance of temporary services and facilities

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B. Related Requirements:

1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.
2. Divisions 01 Section “Temporary Tree and Plant Protection” for protection and pruning of existing trees and plants that are affected by execution of the Work.

C. Temporary utilities may include but are not limited to:

1. Temporary electric power and light.
2. Temporary heating, cooling and ventilating.
3. Telephone service.
4. Water services and distribution.
5. Temporary sanitary facilities, including drinking water.
6. Temporary sewers and drainage
7. Temporary fire protection.

D. Security may include but is not limited to:

1. On-Site -24hour security
2. Security enclosures, fences and lockups
3. Gate attendants and gate house

E. Temporary use of access roads and parking include but are not limited to:

1. Temporary roads and paving
2. Temporary use of grounds for parking, access and laydown space
3. Use of public and private roads to the project site.

F. Temporary controls may include but are not limited to:

1. Dewatering facilities and drains
2. Waste disposal
3. Rodent and pest control
4. Environmental protection
5. Nuisance dust control
6. Noise control.
7. Site area fencing
8. Safety controls
9. Covered walkways at entrances and other locations
10. Protection of grounds including protection of existing hard and soft scape surfaces.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Engineer, testing agencies, and Owner's contractor and authorities having jurisdiction.

1. Contractor shall furnish and install all necessary temporary switches, wiring, fixtures, bulbs, piping and other devices as may be required to connect to existing systems.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use for the temporary facility without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations. The Owner reserves the right to require the Contractor to install meters and, if obvious excessive use is observed, to pay for these utilities. Should water restrictions be issues, the use of surface water on Owner's properties or water system of any kind shall be prohibited. Periodic water restrictions have been experienced within the months of July, August and September. And during periods of water restrictions, contractor shall be responsible for providing water to support the project at no cost to the Owner.

1. When water restrictions are in place, Contractor shall provide clean filtered water to the project at no additional cost.
2. The use of water course water is prohibited.

3. The use of water from any fire hydrant without prior permission from the authority having jurisdiction is strictly prohibited.
4. Contractors who violate these provisions shall be billed at a cost to the contractor at a rate triple the cost if the water had been purchased and supplied by a reputable source. In addition, if it is found that water was supplied from a watercourse, the Contractor shall be responsible for all testing costs associated on the materials the water was used for and the water itself, for any contaminates or organic matter not suitable for the applied use. Contractor shall be responsible for cost of removal of the impacted materials and their replacement.

C. Electric Power Service from Existing System: A moderate quantity of electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations. The Owner reserves the right to require the Contractor to install meters and, if obvious and excessive use is observed, to pay for these utilities.

D. Telecommunications from Existing Systems: A moderate quantity of telecommunications and data connections from Owner's existing system is available for use for a monthly charge. Owner reserves the right to shut down or terminate connections at their discretion.

1. The installation and cost of all data and telecommunications infrastructure required to connect to Owner’s identified demarcation for temporary services shall be the responsibility of the Contractor.
2. The use of CAT6 cable is required and shall have lightning protection installed on both the connection and termination ends.
3. Contractor is responsible to supply their own router and operate the device in a routed mode using RFC1918 private addresses as needed for Contractor’s LAN segment.
4. Remove all conduit and cabling infrastructure previously installed in support of the temporary service when it is no longer required.
5. There is a cost for Network connections $65/month per each connection. Cost for Voice connection, one-time installation charge $75. And a $35.50/month (plus toll) charge per line. Cost of Voice Mail is an additional $7/month per mailbox.
6. Contractor is responsible for contacting and discontinuing service.
7. To arrange for services, contact UConn Help Center: 860-486-4357

E. Contractor Parking: A moderate quantity of campus parking spaces shall be made available within the contract limits. And remaining contractor parking shall be at a remote location to be identified for each campus. Refer to the Contractor Parking requirements located utilizing the following web link: http://updc.uconn.edu

F. Traffic Control: Contractor is responsible for all traffic control requirements and costs. Any state or local road work must have a traffic control police officer present. Any off road work must have a flagman. See further details on Traffic Controls within this section.
INFORMATIONAL SUBMITTALS

A. Site Mobilization Logistics Plan:

1. Prior to and as a condition of mobilization on site, the Contractor shall submit to the Owner, a Site Mobilization Logistics Plan which shall indicate pertinent dates and times, logistics, construction fence, laydown area, traffic flow and compliance with the General Requirements to a level of detail commensurate with the complexity of the construction and the sensitivity of the Owner's ongoing activities on site.

2. Contractor's Site Mobilization Logistics Plan shall be within the limits reflected on the contract documents and in a form consistent with the contract documents, specifically the Site Logistics Guidance Plan established by the Owner and Engineer. The Contractor Site Logistics Plan, shall be sized the same as the plan sheets in the contract documents and address the following, including but not limited to:

    a. Site Access from SRs 195, 32, 44 and North Hill Side Road for any deliveries and Contractor and site vehicles for all Storr's campus projects are to be utilized.
    b. Phases of work, each phase and all work should be documented
    c. Pedestrian Circulation/Detours, ADA Access
    d. Site lines within the construction fence and outside the construction fence.
    e. Safety within the construction fence and outside the construction fence.
    f. Emergency vehicle circulation, 18' minimum width
    g. Vehicular Circulation/Detours
    h. Tracking pads
    i. Construction Circulation
    j. Site perimeter fencing system location
    k. Signs including vehicular and pedestrian detours, project sign and project banners, including their anticipated respective locations.
    l. Staging Area / Stockpile Area
    m. Trailer with allowable parking spaces
    n. Portable Restrooms
    o. Temporary Utilities hookups
    p. Transit Disruptions not limited to road shut downs or Bus/Emergency vehicle access

3. Provide the following for discussion regarding the Site Logistics Plan:

    a. Submittal of the perimeter area Construction Site fencing system: Type (driven/temporary), fence height, fence construction and installation details taking into account the necessary durability during the seasons, and (i.e. snow plowing).
    b. Submittal of the scrim that connects to the fence system.
    c. Regular maintenance controls of the temporary facilities, fencing and grounds within the fenced in area and accesses to the Construction Site area.
    d. Construction Equipment and Vehicle parking requirements anticipated.
    e. Proposed safety and security measures for the Construction Site.
    f. Heavy equipment special needs
    g. Identify where existing parking spaces are impacted by the project limits reflected on the contract documents Site Logistics Plan. Should the project limits change from what is included on the contract documents through no fault by the Owner, and the area needs impact additional parking spaces from what was previously anticipated or additional temporary fencing is required than what was anticipated

on the Site Logistics Plan, the Contractor shall bear all costs associated without additional compensation.

B. Erosion and Sedimentation Control Plan: Show compliance with requirements of DEEP General Permit for the discharge of stormwater and dewatering wastewaters from construction activities or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.

E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust and HVAC control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge Waste handling procedures.
4. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations and authorities having jurisdiction, including but not limited to:

1. Building Code requirements
2. Occupational Health and Safety regulations
3. Utilities regulations and requirements
4. Police, Fire Department and Rescue Squad requirements.
5. Environmental protection regulations.

B. Standards: Comply with NFPA Code 241, "Standard for Safeguarding Construction, Alteration, and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

C. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with National Electric Code (NFPA 70) and local provider requirements and officials having jurisdiction. Permit is required.

D. Tests and Inspections: Arrange for authorities having jurisdiction and service providers to observe installation, testing and inspection for each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates of implementation and termination of each temporary utility. At the earliest feasible time and when acceptable to the Owner, change over from use of temporary services to use of the permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire preventative measures. Do not overload facilities, or permit them to interfere with progress of work. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

C. Construction Site Area: Keep area within and around the perimeter construction fence clean and neat in appearance.

1. Fence system installation and appearance shall be regularly maintained including but not limited to grommets and ties associated with connecting and maintaining toughness of the scrim, fence fabric and/or rails, cleaning scrim, weed whacked,
2. Roads and pathways are to be regularly swept clean of dirt and construction debris. Debris must be properly disposed of in a manner acceptable to the Owner.
3. Completely remove from campus snow and ice on roads and pathways leading from and to the construction site. Stock piling of snow and ice or pushing snow outside the construction fence is not permitted.
4. As growing seasons demand, lawn areas to be kept mowed, planting beds to be kept free of weeds and any tree or scrub trimming is to be performed by plant maintenance personnel.
5. Maintaining outside the perimeter fence, mowing and plowing shall be maintained up to the transition area between the fence and area limit line where the Owner has mowed or plowed to.
6. Always operate and conduct construction activity in a safe and efficient manner. Maintain emergency access and circulation to the facility(s) at all times.

D. Construction Fencing System: The temporary fencing system consists of the fence fabric, rails, poles, and scrim.

1. The system shall be installed immediately as the first step for on-site mobilization. As each section of the fence installation is complete, immediate installation of the scrim shall follow. Fencing system installation shall not commence until all products that make up the system have been delivered to the site and confirmed as meeting the specification requirements. Fencing system shall not be left incomplete over a weekend or holiday. Leave fence system complete with associated scrim and/or banners for the portion of fencing system that has been installed. The Contractor shall not proceed with any other mobilization work until the entire perimeter construction fencing system is complete and in place including the project sign.
2. Fence system shall not be moved or removed without prior authorization from the Owner.
3. In cases where there are safety or environmental conditions, Owner shall direct the Contractor to relocate portions of the fence system at no additional cost to the Owner.
4. Prior to fence system removal, the following conditions are required to be complete:

    a. All excess material and equipment shall be removed from the grounds.
    b. All vehicle parking immediately within the immediate grounds ceases.
    c. All hardscape work has been completed (where feasible).
    d. Complete washing of Owner supplied printed graphical scrim and/or banners.

5. Upon authorization from the Owner to remove the fence system, the Contractor shall perform the following not limited to:

    a. Careful removal, package neatly and secure Owner provide back to the Owner printed scrim and banners. Contractor shall deliver to Owner's designated facility for storage.
    b. Where work was impeded by the fencing system, immediate commence with required planting and grading work.

E. Project Signage: Project signage consist of the Project Construction Sign, the Project Banners and any safety and/or directional signage. All project signage shall be installed and complete within 24 hours of the fence system completion and before work can commence within the site fenced area. Any signage beyond those listed must be preapproved by the Owner prior to posting or installing.

F. Any other signage shall be prohibited on the fence system, site or temporarily attached to equipment or cranes.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged previously used materials in serviceable condition may be allowed but only at the Owner's acceptance. Costs borne by the Contractor to obtain acceptance from the Owner of used material is at the Contractor's expense. Provide materials suitable for the use intended.

B. Chain-Link Fencing: All fence components shall be new or in like new condition, deviations from those requirements must be preapproved by the Owner. No bent or deformed fence components will be acceptable and shall be replaced immediately upon request. All fence posts shall be driven, set plumb and cut off so that they do not protrude beyond top of fence.

C. Construction fencing system shall be engineered.

1. Fence Height: 8’ Height; Fence Material and components: Galvanized Steel
2. Fence Fabric: 2 inch opening, 9 gauge, salvage knuckle
3. Line Posts: 2-3/8 inch OD minimum, however will be dependent on height of fence required.
4. Corner Posts: 2-7/8 inch OD, however will be dependent on height of fence required
5. Top and Bottom Rails: 1-5/8 inch OD, with boulevards.
6. Supporting Posts: Driven and reinforced as required
7. Post Caps: Acorn or loop, all post shall receive caps
8. Installation: All components shall be square, level, taught and properly secured.

D. Portable Panel Chain Link Fencing: All fence components shall be new or in like new condition. All panels shall be installed plumb horizontal (not perpendicular) and no bent or deformed fence components will be acceptable and will be replaced immediately upon request. Panels shall be attached to each other via heavy duty couplers to aid in support

1. Fence Height: 8’ Height
2. Fence Material and components: Galvanized Steel
3. Fence Fabric: 4" x 2" opening, 11 gauge welded mesh,
4. Panel Frame: 1-5/8 inch OD
5. Portable Panel Fence Feet: Plastic or rubber black coated concrete filled feet suitable for proper security and safety of the fence system during any type of weather and/or vandalism events Contractor shall not rely on or assume the use of sand bags. If sand bags will be allowed, they can only be used behind the fence within the construction area and shall be all black in color. Support Stays: Shall be installed every 3 panels or as required by fence manufacturer at a minimum to provide extra stability and maximum strength, support shall have a weight of a minimum of 210 pounds. Contractor shall be responsible to obtain engineered support stays necessary to ensure fence stability in cases of any type weather event.
6. Installation: All components shall be square, level, taught and properly secured.

E. Scrim: If conditions allow for plan scrim, scrim shall be in new or like new condition. Torn scrim will not be acceptable and will be replaced immediately upon request.

1. Plain Woven Scrim

a. Color: Dark Green
b. Size: One piece, full height 8’
c. Opacity: 75% minimum
d. Edge Treatment: Reinforced sewn edges with grommets every 12” o.c

e. Attachment: Zip ties color black at 12" o.c. along perimeter, Scrim shall be installed with consistent equal spacing on top and bottom of the fence height. Shall be taught with no ripples. For portable chain link fencing systems, the scrim shall be installed to cover the fence fabric and posts per portable panel.

2. Printed Graphical Scrim

a. Attachment: Zip ties color black at 12" o.c. along perimeter, scrim must be continuously taught against each chain link panel.

F. Live Screening: If live screening is required, plantings are to be maintained and kept healthy throughout the course of the project including watering, mulch and trimming as needed.

G. Concrete Barricades: Barricades shall be in new or like new condition. Like new conditions shall be defined as having no paint, markings, cracks or gauges on the expose surface. Barricades shall meet CTDOT and Owner standards.

1. Height: 32 inches' minimum
2. Length: 6-foot minimum
3. Width: 24 inches at the base and 6 inches at the top
4. Barricade shall be wrapped with scrim and be able to accept fencing.

H. Green Safety/Snow Fence: Green safety/snow fence may be utilized for work areas as approved by the Owner. Safety/Snow fence shall not be utilized to protect newly installed landscape. areas.

1. Color: Dark Green
2. Size: 4' Height
3. Openings: 3.5" x 1.75"
4. Posts: Steel Green 1" Min

I. Newly Landscape Area Controls: Stakes and rope shall be utilized for protecting newly seeded/sodded areas to restrict access to and to protect from pedestrian and vehicular traffic. Once area has been determined to be accessible to pedestrian traffic, Contractor shall remove stakes and rope, wash clean and turn over to the Owner.

1. Stake: Eco-Step Stake or approved equal
2. Size: 32" height
3. Color: Green
4. Rope: ¼" diameter polypropylene braided rope, color green

J. Safety Controls: Safety or Traffic Cones shall be in new or like new condition. Like new conditions shall be defined as having no paint, markings, cracks or gauges on the expose surface. Cones shall meet the following standards:

1. Road traffic control cones or tubes shall be florescent orange or florescent yellow in color for CTDOT / MUTCD requirements.
2. Grounds Safety Cones shall be lime green in color per Owner requirements.

K. Dust Control

1. Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
2. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
3. Gypsum or Plywood Wallboard: Provide gypsum wallboard complying with requirements of ASTM C 36 on interior walls of temporary partitions.
4. The use of calcium chloride or other chemicals for dust control shall be submitted for approval to the Owner prior to its use.

L. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

M. Water: Provide potable water approved by local health authorities.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Engineer and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of a minimum ten (10) individuals. Provide electrical power service and 120-V ac duplex receptacles, with no less than one (1) receptacle on each wall. Furnish room with conference table, chairs, and four (4) foot square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 75 deg F.
5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

D. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 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.

E. Electrical Power Cords: Power cords shall never be subject to physical damage. 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.

F. Lamps and Light Fixtures: Provide general service LED lighting with wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior LED fixtures where exposed to moisture.

G. First Aid Supplies: Comply with governing regulations.

H. Chiller, 103 ton capacity, air cooled. Trane model CGAM or equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use qualified personnel for design and installation of temporary facilities. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Owner and shall be built with labor and materials furnished by the Contractor without expense to the Owner. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed at its expense upon completion of the Work. With the advanced written consent of the Owner, the temporary buildings and utilities may be abandoned and need not be removed.

D. Noise Control: The Contractor shall make every effort to minimize noise disruption to occupants of buildings and adjacent buildings. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site. No noise generating work that interferes with classroom operation shall be tolerated. No noise generating work shall be allowed during exam periods where the noise will impact classroom functions. Examples of noise generating work include, but are not limited to sawing, drilling and hammering and/or jackhammering.

1. Avoid use of tools and equipment, which produce harmful noise. No gasoline-powered equipment shall be used during times that the buildings are occupied. No gasoline-powered equipment may be used in the interior of buildings at any time.

2. Refer to 01-1000 Summary as well as 01-5719 Temporary Environmental Controls for more requirements on Noise, Vibration and Odors.

E. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

1. All removed materials that are salvageable are the property of the Contractor unless otherwise noted in the specifications.
2. All debris resulting from the performance of this contract will be the property of the Contractor and will be completely removed from the campus and disposed of in a legal manner.
3. Chutes shall be black in color and dumpster type containers designed to keep dust and spillage to a minimum will be used by the Contractor. Dumpsters will be completely covered with a waterproof covering at all times when not in use. Remove from the site daily of all dumpsters that are full or over flowing.

F. Nuisance Dust Control: The following provisions shall apply during demolition or construction phases of work:

1. It is the intent of this specification to insure that nuisance dusts resulting from demolition or construction activities do not impact occupied areas of the building and surrounding the site. The Contractor shall take all measures necessary to accomplish this goal. These measures will include as minimum polyethylene sheeting or wet methods of fugitive dust control. Keep all adjacent roads free and clear of dust and debris.

2. The Contractor shall submit a plan prior to commencement of work that will detail all methods of dust control. This plan shall be approved by the Owner prior to commencement of work. Failure to comply shall result in immediate stoppage of work until effective dust control measures are employed.

3.2 TEMPORARY UTILITY INSTALLATION AND CONTROLS

A. General: Installation of temporary service or connecting to existing service.

1. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
2. Arrange with appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.
3. Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.
4. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
5. For temporary service or connection to existing or new service: The Owner must be notified at least four (4) weeks in advance of any proposed interruption in order that all affected departments may be advised and have time to adjust their schedules accordingly. For new service, there are limited times within a year that the services can be impacted for a total shut down. Arrange adequate time with the Owner in preparation for the shutdown connections. Construction schedule must allow for advanced notification. Failure to plan ahead and notify the Owner of a pending shut down shall not relieve the Contractor from lost time. Owner reserves the right to limit the down time to a specified number of net hours and to set the date for each occasion of complete shutdown.
6. Any service (steam, water, electricity, etc.) shutdown which will interrupt the continuity of an experiment or be detrimental to a research project or which, in the opinion of the Owner, is required for other valid reasons, shall be maintained by safe and adequate temporary means and such temporary piping, wiring and associated devices shall be removed when no longer required.
7. Sewers and Drainage: If sewers are available, provide temporary connection to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.
8. Connect temporary sewers to the municipal system as directed by the sewer department officials.
9. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
10. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction. Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

11. Sterilization: Sterilize temporary water piping in accordance with AWWA requirements prior to use.

B. General: Installation of any Utilities

1. Soils: Filter out soil of construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.

    a. Existing soils shall be handled in the manner outlined within the University's Contractor Environmental Health and Safety Manual.
    b. Residual soils shall be tested for contaminants prior to its removal from Owner's contiguous property.
    c. Testing shall be incompliance with the residential direct exposure criteria and/or the applicable pollutant mobility criteria.
    d. Soils cannot be transported from one Owner property to another without testing and acceptance of the test results by the Owner.
    e. Residual soils shall not be saved and stock piled on any Owner property, without prior written approval from the Owner.

2. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

    a. Use of Owner's existing sanitary facilities will not be permitted.
    b. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
    c. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used materials.

3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
4. Provide safety showers, eyewash fountains and similar facilities for convenience, safety and sanitation of personnel.
5. Drinking Water Facilities: Provide drinking water including paper supply.
6. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
7. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
8. Steam from the Owner's steam lines shall be provided at no cost to the Contractor. Contractor shall supply, install and maintain all temporary piping, radiators or unit heaters, reducing valves, steam traps and other necessary fittings and accessories. Traps shall be provided to prevent steam from entering main returns. The temporary heating plan shall meet the approval of the Engineer, Fire Marshal and Owner. Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperature or high

humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

9. The Contractor shall provide temporary heat during construction for interior areas included in the Contract, and any adjacent or nearby occupied areas, to counteract low temperatures or excessive dampness and in any event, between October 15th and May 15th, maintain during said period or periods until final completion of the Contract, unless otherwise approved by the Owner in writing. Provide heat and ventilation to maintain specified conditions for construction operations and to protect materials and finishes from damage by temperature or humidity. All installation and operating costs shall be paid by the Contractor. Unless otherwise specified in the Contract Documents, the temporary heating shall be sized to maintain the following conditions on a 24-hour-per-day basis:

    a. Occupied Dormitory or Living Areas: 69 degF
    b. Office Spaces/Laboratories/Classroms: 68 degF
    c. Warehouses/Storae: 55 degF

    The areas listed above are for example only. The Owner shall have sole discretion to assign minimum heating criteria.

10. The Contractor shall provide temporary cooling during construction for interior areas included in the Contract. This includes the procurement and installation of a temporary air cooled chiller equal to or exceeding the capacity of (1) of the existing chillers, approximately 103 tons. The temporary chiller is to be connected to the existing chilled water distribution system and maintain a chilled water supply temperature of 45°F, or as directed by the Owner. Provide cooling to maintain specified conditions in the occupied spaces during the construction process. All installation and operating costs shall be paid by the Contractor.

    a. Refer to the engineering documents for details and additional information. The location shown on the drawings for the temporary chiller is intended as a guide. Consult with the Owner for an approved location. Other ongoing projects in the area of this project could impact the location.
    b. The Owner shall have sole discretion to assign minimum heating criteria.

11. Electrical Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.
12. Except where overhead service must be used, install electric power service underground.
13. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance
14. Lighting: Provide weatherproof, grounded LED lighting.
15. Whenever overhead floor or roof deck has been installed, provide temporary lighting with local switching.

16. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction and traffic and safety conditions.
17. Install exterior yard and sign lights so that signs are visible when Work is being performed.
18. Security: Provide temporary security of the construction site to fulfill safety and security requirements. Protect all workers, stored and installed materials, equipment and property during and after working hours.
19. Telephones: Provide temporary or cellular telephone service for all personnel engaged in construction activities, throughout the construction period. Contractor shall arrange and pay for his own telephone service.
20. Distribute to the project Team and Post for public viewing a list of important telephone numbers.

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Contractor's emergency after-hours telephone number.
    e. Engineers' office.
    f. Owner’s office.
    g. Principal subcontractors' field and home offices.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

    a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, filter-equipped vacuum equipment.

D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
2. Provide dehumidification as required to mitigate mold growth.

E. Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
4. Provide supervision of all welding operations, combustion type temporary heating units, and similar sources of fire ignition.
5. No gasoline shall be stored in or close to the building at any time.
6. Facilitate fire department access and review.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Engineer Schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
3. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access.
4. Ensure that any existing walkways, egress paths, exterior lighting or emergency phones impacted by the construction area are relocated.

B. Field Offices and Sheds: A field office is (not) required for this project, however should the Contractor choose to provide a field office, see requirements below:

1. Provide non-combustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.
2. Field Offices: Provide insulate, weathertight temporary offices with electric lighting, air conditioning and heat and of sufficient size to accommodate required office personnel at the Project Site. The Field Office shall have two rooms, each approximately 150 square feet in size. The offices shall have ample natural light, a heater of sufficient capacity to

maintain 70 degrees F in winter and an air conditioner of sufficient capacity to maintain 75 degrees F in summer. No trailer will be allowed on Owner property unless permanent markings indicating the name of the company are clearly visible. Keep the office clean and orderly of use for small progress meetings. Furnish and equip offices with a minimum of the following:

a. Furnish with desks and chairs, file cabinets, plan tables, plan racks, waste receptacles, conference room table and at least eight chairs.
b. Equip with a water cooler and private toilet complete with water closet, lavatory and mirror-medicine cabinet unit.
c. Equip with a 5 lb ABC fire extinguisher and an OSHA-approved first aid kit.
Equip with a facsimile machine and copier for use by the Contractor, Owner and Engineer.

C. Temporary Roads and Paved Areas: Comply with the following:

1. The Contractor shall, under regulation prescribed by the Owner, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Owner. When materials are transported in prosecuting the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage and provide appropriate traffic markings and cross walks. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

2. Provide dust-control treatment that is non-polluting and non-tracking. Reapply treatment as required to minimize dust. The use of calcium chloride or other chemicals for dust control shall be submitted for approval to the Owner prior to its use.

3. Construct and maintain temporary roads and paving to adequately support the indicated loading and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas and parking where the same permanent facilities will be located. Review proposed modifications to permanent paving with the Engineer.

a. Paving: Comply with Division-2 Section “Asphalt Concrete Paving” for construction and maintenance of temporary paving.
b. Coordinate temporary paving development with subgrade grading, compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.
c. Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas that are without damage or deterioration when occupied by the Owner
d. Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion, unless it adversely effects the site and access road. Coordinate with weather conditions to avoid unsatisfactory results.
e. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration and supervision.

f. Contractor shall sweep and remove all construction debris from all roads outside of construction zone daily or more frequently as is required by weather conditions and/or to the satisfaction of the Owner.

D. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."
5. Maintain access for fire-fighting equipment and access to fire hydrants.
6. Contractor shall sweep and remove all construction debris from all roads outside of construction zone daily to the satisfaction of the Owner and those having jurisdiction at the Contractor's expense.

E. Use of Existing Roads: Contractor shall comply with Owner's requirements for use of existing roads within Owner's property and outside Owner's property. For details refer to the following weblink: http://updc.uconn.edu/

F. Temporary Use of Owner's Property: Use of the Owner's grounds for access and laydown shall be as outlined in the Site Logistics Guidance Plan. The protection of trees, planting beds, lawns and soil structure shall be the primary focus.

1. Install tree and plant protection prior to the installation of other site fencing
2. Limit vehicle traffic and staging to designated areas to prevent soil compaction. Employ surfaces that protect the underlying soil structure during construction
3. Maintain trees, lawn areas and planting beds during construction so green material is thriving at the conclusion of the project.
4. Submit restoration plan for these areas including decompaction, pruning, mowing, fertilizing, etc. prior to returning the campus grounds to the campus open space fabric.

G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice to minimize accumulations within the construction site and shall not impact safe travel of University grounds outside the construction site.

a. Remove from the construction site, haul and dispose outside of Owner property. Contractor shall not dispose on any Owner property under any condition.
b. Approved de-icing products for all Owner campuses include:

1) Rock salt treated with a pre-wetting agent containing a corrosion inhibitor with a minimum 30% magnesium chloride.
2) Calcium chloride
3) Magnesium chloride

c. Sand is not permitted.

H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

I. Temporary Elevator Use: In an existing building with a freight elevator, the Contractor will be permitted to use the elevator for freight service and transportation of construction personnel during the construction period with prior approval from the Owner. This elevator must also be available to the Owner at all times; coordinate usage with the Owner. Reliance on the existing elevators by the Contractor is solely at the Contractors own risk. At the end of construction, restore the elevator to its original condition; replace worn cables, guide shoes and similar items of limited life. Use of other elevators by the Contractor will not be permitted.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. Existing Stair Usage: Use of Owner's existing emergency stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities systems and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities at no cost to the Owner

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 01 Section "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with the latest requirements of DEEP General Permit for the discharge of stormwater and dewatering wastewaters from construction activities or authorities having jurisdiction, whichever is more stringent and requirements specified in Division 31 Section "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of the latest DEEP General Permit for the discharge of stormwater and dewatering wastewaters from construction activities or authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Division 01 Section "Temporary Tree and Plant Protection."

1. Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

G. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials. With the exception of stinging insects.

H. Site Enclosure Fence: Prior to commencing any work or mobilization, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering the site except by entrance gates. All fencing to have reinforced scrim sheeting which is provided by the Owner.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations or as indicated on Drawings and noted in the approved Site Logistics Plan.

a. Prior to fence installation, a fence system submittal shall be submitted and approved by the Owner. A pre-installation conference shall be held with all sub-contractors and workers responsible for supplying and installing the fence to go over the plan and the expectations.
b. All fence material, fence fabric, posts, panels, feet, scrim and banners shall all be on site prior to commencing installation.
c. Site fence shall be installed in accordance with the following

1) Fence Posts and the top and bottom rail shall be installed and cut to appropriate height/length.
2) Chain link fence shall be installed. Fence posts shall not exceed the fabric installation by more than 50 feet.
3) Reinforced scrim shall be installed. Chain link fence shall not exceed the scrim installation by more than 50 feet. Scrim shall be installed flush with the top of the fence so that the top salvage knuckle is not visible. Scrim shall then be stretched tight to cover the entire height of the fence. Horizontal joints shall not be permitted. The scrim shall be taught and free of wrinkles. Vertical scrim joints shall be overlapped to give the appearance of continuous piece of scrim.
4) Contractor to install owner provided decorative banners on the exterior side of the site enclosure fencing as directed by Owner.

2. Phasing of work: As the work progresses, depending on safety and limitation conditions, the Contractor shall relocate or reduce the site fencing as required at no additional cost to the Owner.

I. Security Enclosure and Lockup: Install enclosure around partially completed areas of construction. Coordinate with Owner's Fire Marshall and install Owner provided lockable pad locks for entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Construction gates shall be closed at all times during the day to prohibit the general public from entering the site. Ensure no safety cones are left outside of the fence enclosure after deliveries. Lock entrances at end of each work day.

J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction and the Owner for erecting structurally adequate barricades, including warning signs and lighting.

K. Temporary Egress: Maintain temporary egress from existing occupied facilities at all times and as required by authorities having jurisdiction.

L. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.

1. Construct covered walkways using scaffold or shoring framing.
2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
3. Where required by OSHA regulations provide temporary lighting under covered walkways to satisfy requirements.
4. Covered walkways shall maintain a minimum clear height of 8ft above walking surface, and shall be designed to support all imposed loads and a minimum live load of 150 psf.

M. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

N. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

O. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with Owner's fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

P. Temporary Lighting and Security Phones: Installation of temporary fencing, temporary egresses, temporary enclosures, covered walkways and the like shall take into consideration the affects to existing lighting, cameras and emergency code blue phones. Relocate any existing lights and/or code blue phones in order to maintain sufficient lighting and line of site of blue phones.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction. Remove any materials that appear to have been affected by moisture as determined by testing and the Owner.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for (48) hours are considered defective.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Engineer.
    c. Remove materials that cannot be completely restored to their manufactured moisture level within (48) hours.

3.6 TRAFFIC CONTROL

A. Due to the large volume of pedestrian and vehicular traffic within the campus, it shall be the responsibility of the Contractor to provide traffic and pedestrian accessibility to all areas of the campus as applicable.

B. The Contractor shall comply with Connecticut Regulation13b-17-28, Safety to Traffic, which requires that "When portions of the traveled way are made dangerous for the movement of vehicles or pedestrians, a sufficient number of uniformed police officers, flagmen, or traffic men, shall be employed by the permittee to direct traffic safely through the area."

C. The requirement to maintain pedestrian and vehicular traffic is further defined in the Connecticut Department of Transportation Specifications Section 9.71, Form 814, which requirements are incorporated herein by reference.

D. The Contractor is required to contact the Owner’s Police Department to determine jurisdiction. Thereafter Contractor may contact the Town of Mansfield Police Department or other state or private sources directly to obtain the necessary manpower to comply with these regulations. The Owner shall be informed by the Contractor of his traffic control procedures prior to the commencement of construction.

E. At all entrance gates a flag person shall be employed to coordinate project deliveries and manage pedestrian as well as vehicular traffic. This person shall also be responsible for closing the site access gates after each delivery.

3.7 PROJECT IDENTIFICATION AND SIGNS

A. Project Identification Signs:

1. Decorative banners for the site enclosure fencing shall be provided by the Owner and installed by the Contractor. Such banners shall be installed immediately following scrim installation. Utilize ties used for scrim.

2. Decorative scrim for the site enclosure fencing shall be provided by the Owner and installed by the Contractor. Non-decorative scrim shall be supplied and installed by the Contractor.

3. Construction Project Sign shall be provided and installed by the Contractor and shall simultaneously be installed with the installation of the temporary fencing. See details on the size and typical design layout of the sign and installation requirements located on the Owner's website: http://updc.uconn.edu.

B. Temporary Signs: Prepare signs to provide directional and safety information to construction personnel and visitors. 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, except those required by law.

1. All detour signs required by CTDOT shall be submitted to and approved by the Owner. The Owner reserves the right to adjust size, color and placement of signs.

C. Other directional and detour Signs: Other directional and/or detour signs not required by the CTDOT shall adhere to project specific specification requirements and be submitted to the Owner for approval.

3.8 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses directly related to the project.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Prevent water filled piping from freezing.
3. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion has been formally recognized.

D. Termination and Removal: Unless the Owner requests that it be maintained longer, remove immediately each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction immediately when such temporary surface is no longer required.
3. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that do not meet the material component requirements specified. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
4. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

    a. Replace air filters and clean inside of ductwork and housings.
    b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
    c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.
    d. Restore all existing facilities and grounds used during construction to specified requirement or to original condition. Restoration shall include but not limited to:

        1) Removal of compacted grounds area due to equipment and vehicular access and movement to and within the site work area. Adding of compost and other nutrients to the soil to meet the Project standards for lawn/turf establishment.
        2) Pruning and mulching of existing planting beds that are within the construction fence area. Restore grass areas immediately surrounding and within the Construction fence area to blend with other surrounding plantings and grass areas maintained by the Owner. Should there be no Project standards for lawn/turf establishment, Contractor shall follow the Owner’s requirements for turf restoration.

    e. Remove completely from ground surfaces all “call before you dig” and other pavement markings made in support of the project. Covering over of markings is not acceptable.

END OF SECTION 015000

SECTION 016000 - 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. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Alternates" for products selected under an alternate.
3. Division 01 Section "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in Division One Section "Substitutions".
2. Engineer's Action: Review action shall follow all requirements specified in Division One Sections on "Substitutions" and "Submittals".

a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
b. Use product specified if Engineer does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Engineer will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See Divisions 02 through 26 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Engineer will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations and not by previous Project experience. Procedures governing product selection include the following:

1. Proprietary Specification Requirements: Where Specifications name only a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Semi proprietary Specification Requirements: Where Specifications name three or more products or manufacturers, provide one of the products indicated. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Where products or manufacturers are specified by name, accompanied by the term “or equal,” or “or approved equal” comply with the provisions concerning “substitutions” to obtain approval for use of an unnamed product.

3. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contact requirements. Comply with provisions concerning “substitutions” to obtain approval for use of an unnamed product.

4. 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.

5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.

a. Manufacture's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.

6. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

7. Visual Matching Specification: Where Specifications require "match Engineer's sample", provide a product that complies with requirements and matches Engineer's sample. Engineer's decision will be final on whether a proposed product matches.

   a. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.

8. Visual Selection Specification: Where Specifications include the phrase "as selected by Engineer from manufacturer's full range" or similar phrase, select a product that complies with requirements. Engineer will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

9. Allowances: Refer to individual Specification Sections and provisions in Section 01-2100, Allowances, for allowances that control product selection, and for procedures required for processing such selections.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Proposed changes are in keeping with the intent of Contract Documents.
3. The request is timely, fully documented and properly submitted.
4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
5. The specified product or method of construction cannot be provided within the Contract Time.

   a. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

6. The specified product or method of construction cannot receive necessary approval by a governing authority.
7. A substantial advantage is offered the Owner, in terms of cost, time, energy conversation or other considerations of merit, after deduction offsetting responsibilities the Owner may be required to bear.

    a. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

8. The specified product or method of construction cannot be provided in a manner that is compatible with other material, and where the Contractor certifies that the comparable product will overcome the incompatibility.
9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed comparable product can be coordinated.
10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed comparable product provide the required warranty.
11. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
12. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
13. Samples, if requested.

B. The Contractor's submittal and Engineer's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid submittal, nor does it constitute approval.

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 016000

SECTION 017300 - EXECUTION

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. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Division 01 Section "Summary" for limits on use of Project site.
2. Division 01 Section "Submittal Procedures" for submitting surveys.
3. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
4. Division 02 Section "Selective Structure Demolition" for demolition and removal of selected portions of the building.
5. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

B. Cutting and Patching Plan: Submit plan describing procedures at least fourteen (14) days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying and GIS services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Engineer of locations and details of cutting and await directions from Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades for review of plan. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in sustainable design requirement Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Engineer for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: 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, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. And coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Verification of measurements and locations shall be performed by a licensed surveyor who will collect the GIS coordinates that will be included in the final as-built documentation.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Engineer according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and 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 two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Owner. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Owner before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Document slope and locations of material and product below and above ground on all utilities. Such documentation shall be performed by a licensed surveyor who will collect the GIS coordinates that will be included in the final as-built documentation.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels or create high vibrations.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect as approved by the Engineer. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Division 01 Section "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: 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.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions are removed; extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80° F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

5. Follow all Owner sustainable design requirements, not limited to LEED.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove of non-hazardous liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Construction Waste Management and Disposal.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. 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.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017700 - 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. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warrantee Requirements
4. Submittal of Warranties.
5. Revenue Services Requirements
6. Final cleaning.
7. Repair of the Work.

B. Related Requirements:

1. Division 01 Section "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Division 01 Section "Execution" for progress cleaning of Project site.
3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
5. Division 01 Section “Demonstration and Training” for requirements for instructing Owner’s personnel
6. Divisions 02 through Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Review list of Owner requirements as conditions for meeting substantial completion. List is located at the following weblink: http://updc.uconn.edu

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

1. Contractor’s punch list shall be complete and shall cover the entire contract scope, unless previously identified within the contract documents that the project will be completed in phases.
2. Upon receipt of Contractor’s punch list of incomplete items, depending on the amount of remaining finish work, Engineer may begin generating their own punch list. If the Engineer determines that the Contractor’s punch list is significantly deficient or contains a significant amount of unfinished work to meet substantial completion, Engineer will formally notify the Contractor accordingly with no further action. Contractor shall continue to complete unfinished work until the Engineer determines that Substantial Completion has been met.
3. Any time and expenses incurred by the Engineer to re-review completeness of Contractor’s work to determine Substantial Completion has been met, shall be at the Contractor’s expense,

B. Submittals Prior to Substantial Completion: Complete the following a minimum of (14) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including but not limited to project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property coordinate mapping surveys, and similar final record information.
3. Submit closeout submittals specified in individual Divisions 02 through 26 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Divisions 02 through 26 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Labels must clearly identify what the maintenance material is for what piece equipment, with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner signature for receipt of submittals.

5. Submit a statement that all air flush-out procedures were performed. Include process used and dates when flush-out was started and completed. Filtration media must be replaced after flush-out process was completed. If procedure was performed prior to dust creating work was complete, Contractor must perform an additional process.
6. Submit test/adjust/balance records.
7. Submit systems curves for air and water systems,
8. Submit sustainable design submittals required in Division 01 sustainable design requirements Section and in individual Division 02 through 26 Sections.
9. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of (14) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform air flush-out procedures and replace filtration media after flush-out of the building’s systems. Replace all filters.
5. Perform adjustments and balancing of systems, provide reports
6. Perform preventive maintenance on equipment and systems used prior to Substantial Completion, regardless if the equipment was existing. Advise Owner of changeover in heat and other utilities.
7. Conduct inspection and walkthrough with local authorities having jurisdiction.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Remove temporary fencing.

    a. Power wash all Owner supplied scrim. Let dry and neatly roll/fold scrim and deliver to Owner’s designated storage location.

10. Complete final cleaning requirements, including touchup painting.
11. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
12. Provide as-built documentation of changes made in the field or in cases where no field changes occurred, certified statement from the trade contractor documenting such.

a. Contractor shall remain responsible for costs that may occur should existing conditions be found that are not reflected within the as-built documents provided for closeout.

13. All surveys and survey information as outlined within quality control of Division One.

a. Should the Contractor fail during the course of the work to have licensed survey of required coordinate points and document information outlined within the contract documents, Owner shall have such work performed by others, at the Contractors expense.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of (14) days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings as specified in Division 01 Section "Demonstration and Training."
2. Submit a final Application for Payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
3. Submit an updated final Application for Payment statement, accounting for final additional charges to the Contract Sum.
4. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
5. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
6. 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 responsibility for corresponding elements of the Work.
7. Submit consent of surety to final payment.
8. Submit a final liquidated damages settlement statement.

9. Any attic stock that has been outlined to be provided shall be acknowledged as received by the Owner. Copy of transmittal listing the material/parts and quantities with Owner signature of acceptance.
10. Pest control inspections and warranty
11. Construction progress photographs

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of (14) days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when all the Work identified in previous inspections as incomplete is completed or corrected.
2. Upon completion of reinspection, the Owner with advice of the Engineer will prepare a Certificate of Final Acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
3. If necessary, reinspection will be repeated at the Contractor's expense.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Engineer.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format or format approved by Owner:

    a. PDF electronic file. Engineer will return annotated file.

1.9 WARRANTY RESPONSE REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. All work shall be covered by the standard one (1) year guarantee as set forth in the General Conditions. The Contractor with his subcontractors shall visit the project site at 11 months into the guarantee period to determine with the Owner the scope of any required guarantee work. The Contractor shall contact the Owner and Engineer for scheduling so that the Owner and Engineer can attend.

C. Partial Occupancy: Submit properly executed warranties within (15) days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

D. Specific requirements for warranties for the Work and products and installations that are specified to be warrantee are included in the individual Sections of Divisions 2 through 26.

E. Disclaimers and limitations: Manufacturer’s disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

F. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Organize based on the format outlined within the Owners closeout check list. Provide two hardcopies complete draft for Engineer reviews. Submit one final electronic document as final
2. Address to: Office of Planning, Architectural and Engineering Services, University of Connecticut Box Unit-3038, Storrs, Connecticut 06269-3038
3. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark 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 Installer.
4. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name and number, and name of Contractor.
5. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document and contact information for each warrantee including extended warrantees Define distinct warrantee coverage and contact information for each warrantee.
6. All required guarantees/warranties will be by the respective company made out to the Owner.
7. All guarantees/warranties supplied by subcontractors or manufacturers shall be countersigned by the Contractor.

G. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.11 REVENUE SERVICES REQUIREMENTS

A. Upon receipt of the Certificate of Substantial Completion, the Contractor shall submit the following information required by the Connecticut Department of Revenue Services.

1. The identity and addresses of all subcontractors performing work on the project.
2. The Connecticut tax registration numbers of the Contractor and all subcontractors.
3. The Federal Social Security account numbers, or Federal Employer Identification numbers, or both, if applicable, for the General Contractor and all subcontractors.
4. Include a copy of the transmittal sent to the Department of Revenue on project contacts information that is to be included within the closeout manual.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Clean catch basins affected by construction activities.
c. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
d. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
e. Remove tools, construction equipment, machinery, and surplus material from Project site.
f. Remove snow and ice to provide safe access to building.
g. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
j. Remove labels that are not permanent.
k. Clean and polish tile and other glazed surfaces affected by construction activity.
l. Clean and polish finish hardware affected by construction activity.
m. Clean exposed surfaces of diffusers, registers, and grills affected by construction activity.
n. Replace all filters of equipment and systems used during construction.
o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency that were affected by construction activity.
p. Leave Project clean and ready for occupancy.
q. Remove all sediment control for catch basins and fully clean out catch basin.

C. Pest Control: Comply with pest control requirements in Division 01 Section "Temporary Facilities and Controls." Prepare written report.

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 fury 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 in a lawful manner.

1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.3 CERTIFICATIONS

A. The Contractor, at completion of construction, shall provide to the Owner on company letter head a "Certificate of Substantial Compliance" bearing original signatures of an officer of the company reflecting the following:

1. Address to: University of Connecticut c/o University Master Planner and Chief Architect, Planning Architectural and Engineering Services, 31 LeDoyt Road, Storrs, CT 06269-3038;

2. Identify the Project number and Project Name;
3. Project's Description of work: As represented within Division 01 Section 1000 Summary.
4. Certification Statement:

   I, the undersigned, am the official authorized agent to execute contracts on behalf of (insert official legal name of contracting Company). I certify that (insert official legal name of contracting Company) pursuant to the statutory and contractual requirements applied to this Project, CERTIFY that, in my professional opinion, the complete structure/renovations described above is in substantial compliance with the approved construction documents on file with the University of Connecticut. Minor deviations and special stipulations are noted below (if any, list)".

   The above statement is Sworn as True to the best of my knowledge and belief, subject to the penalties of false statement.

5. Print Name of the Authorized Agent:
6. Provide signature of the Authorized Agent:
7. Date:
8. Subscribed and acknowledged before me this _____ day of _____, 20___.
9. Notary Seal and signature.

B. The Contractor, at completion of construction, shall provide to the Owner on company letter head bearing original signatures of an officer of the company certifying that they will maintain required insurance coverage. Such document shall reflect the following:

1. Address to: University of Connecticut c/o University Master Planner and Chief Architect, Planning Architectural and Engineering Services, 31 LeDoyt Road, Storrs, CT 06269-3038;
2. Identify the Project number and Project Name;
3. Project's Description of work: As represented within Division 01 Section 1000 Summary.
4. Certification Statement:

   I, the undersigned, am the official authorized agent to execute contracts on behalf of (insert official legal name of contracting Company). I certify that (insert official legal name of contracting Company) pursuant to the statutory and contractual requirements applied to this Project, shall maintain the contractually required insurance coverage and limits for a period of no less than three (3) years after final payment and final completion of the work.

   The above statement is Sworn as True to the best of my knowledge and belief, subject to the penalties of false statement.

5. Print Name of the Authorized Agent
6. Provide Signature of the Authorized Agent
7. Date:
8. Subscribed and acknowledged before me this _____ day of _____, 20___.
9. Notary Seal and signature.

C. Prior to Owners' approval and acceptance, mechanical and electrical systems shall be fully commissioned by the Contractor and Commissioning Agent (when applicable) and is efficiently operational.

PART 4 - SCHEDULES

4.1 SCHEDULE OF WARRANTIES

A. Schedule: Provide warranties and bonds on products and installations as specified in the following Sections:

1. Section 07920 – Joint Sealants Joint Sealants

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

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. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency procedures and contacts.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance and warrantee manuals.

B. Related Requirements:

1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

2. Divisions 02 through 26 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Engineer will comment on whether content of operations and maintenance submittals are acceptable.

2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Engineer.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

2. One paper copy, separately bound. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. Initial Manual Submittal: Submit two draft copies of the manual at least 30 days before commencing demonstration and training. Engineer and Owner will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Engineer will return copy with comments.

1. Correct or revise the manual to comply with Engineer's and Owner’s comments. Submit copy of corrected manual within (15) days of receipt of Engineer's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. Table of contents.
2. List of all Subcontractors and Suppliers – name, address, contact and federal identification numbers.
3. List of all drawings and their number and title, including all additions and deletions during the course of the project.
4. List of specification section numbers and title.
5. List all redlined as-built documents.
6. List of systems.
7. List of equipment.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for the emergency, operation, and maintenance manual.

E. Updated List of Subcontractors and Suppliers: List all contractors, subcontractors, sub-tier subcontractors and suppliers who worked on or supplied material to the Project. Include name of the firm, firm's address, firm's contact person, contact phone number, Connecticut registration number and Federal employer identification number (FEIN),

F. Identification: In the documentation directory and in the operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Project Number
4. Name and address of Owner.
5. Date of submittal.
6. Name and contact information for Contractor.
7. Name and contact information for Engineer.
8. Name and contact information for Commissioning Authority, (if applicable).
9. Names and contact information for major consultants to the Engineer that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, scans shall be in color at 600dpi with searchable capabilities.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Operations and Maintenance Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY PROCEDURES TO BE INCLUDED IN O&M MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.

3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Project record documents shall only be used as a supplement to the manufacturers documentation as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."

G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

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. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Division 01 Section "Closeout Procedures" for general closeout procedures.
2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Divisions 02 through 26 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit one (1) paper-copy set of marked-up record prints.
2) Engineer will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit one (1) paper-copy set of marked-up record prints.
2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.

E. Reports: Submit written report monthly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.

j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Engineer's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Engineer and or Construction Manager.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit Record Specifications as paper copy.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders] and record Drawings where applicable.

B. Format: Submit record Product Data as paper copy.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Engineer's and Owner Representative’s reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

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. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

B. Related Requirements:

1. Divisions 02 through 26 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Engineer.

1.6 PRODUCTS

1.7 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.
c. Operating standards.
d. Regulatory requirements.

e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project record documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

    a. Diagnostic instructions.
    b. Test and inspection procedures.

7. Maintenance: Include the following:

    a. Inspection procedures.
    b. Types of cleaning agents to be used and methods of cleaning.
    c. List of cleaning agents and methods of cleaning detrimental to product.
    d. Procedures for routine cleaning
    e. Procedures for preventive maintenance.
    f. Procedures for routine maintenance.
    g. Instruction on use of special tools.

8. Repairs: Include the following:

    a. Diagnosis instructions.
    b. Repair instructions.
    c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    d. Instructions for identifying parts and components.
    e. Review of spare parts needed for operation and maintenance.

PART 2 - EXECUTION

2.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Division 01 Section "Operations and Maintenance Data."

B. Set up instructional equipment at instruction location.

2.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

    1. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner through Owners Representative with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

SECTION 020720 - MINOR DEMOLITION FOR ALTERATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division I, Specification Sections apply to this Section.

1.2 WORK INCLUDED

A. Remove designated building equipment and fixtures.

B. Remove all mechanical equipment and distribution systems to be replaced by new equipment unless specifically noted to remain or designated to be reused in the new work. Disconnect and remove utility connections. Remove all piping, conduit, wire, ductwork and accessories not noted to be reused or remain.

C. Remove existing materials and construction not indicated to remain.

D. Remove and reinstall existing materials and construction as required for installation of new Work.

1.3 PROTECTION

A. Do not interfere with use of adjacent portions of the building. Maintain free and safe passage to and from.

B. Prevent movement or settlement of structures. Provide and place bracing or shoring and be responsible for safety and support of structure. Assume liability for such movements, settlement, damage, or injury.

C. Cease operations and notify the Project Manager immediately, if safety of the structure appears to be endangered. Take precautions to properly support structure. Do not resume operations until safety is restored.

D. Provide erect and maintain barricade and lighting as required by applicable regulatory agencies to protect occupants of building and workers.

E. Notify the Owner if hazardous materials are encountered.

1.4 QUALITY ASSURANCE

A. Provide qualified licensed tradesmen to perform appropriate tasks.

B. Provide all tests before, beginning and after removal is complete as required by all governing bodies.

PART 2 - PRODUCTS

2.1 MATERIALS

A. NONE

PART 3 - EXECUTION

3.1 PREPARATION

A. Erect and maintain weatherproof closures for exterior openings. Maintain exit requirements.

B. Erect and maintain dustproof partitions as required to prevent spread of dust, fumes, noise, and smoke to other parts of the building. On completion, remove partitions and repair damaged surfaces to match adjacent surfaces.

C. Carry out demolition work to cause as little inconvenience to adjacent occupied building areas as possible.

3.2 REMOVALS

A. Removals shall be done without damage to adjacent retained work; however, where such work is damaged, the Contractor shall patch, repair, or otherwise restore same to its original condition. All existing materials, fixtures, and equipment which have been removed or disconnected but are not indicated or specified to be reused in the new Work, shall become the property of the Contractor and shall be removed from the site by the Contractor at his own expense. Removals shall be as indicated and as specified herein, and shall be performed in a neat and workmanlike manner to the limits indicated or specified, or the minimum extent necessary or required for the proper installation of new Work. Existing surfaces remaining after removals to which new Work is to be applied shall be left in a condition suitable for the application of new Work.

3.3 DEMOLITION

A. Demolish in an orderly and careful manner as required to accommodate new work.

B. Protect existing structural members.

C. Perform demolition in accordance with applicable authorities having jurisdiction.

D. Repair all demolition performed in excess of that required, at no cost to the Owner.

E. Burning of materials on site is not permitted.

F. Remove from site, contaminated, vermin infested or dangerous materials encountered and dispose of by safe means so as not to endanger health of workers and public.

G. Remove demolished materials, tools and equipment from site upon completion of work. Leave site in a condition acceptable to the Project Manager.

H. The Contractor is responsible for the complete removal and legal disposal of all debris, including all required permits and fees. Contractor prior to bidding shall ascertain location of disposal and recycling facilities that will accept removed materials from this project. Base Bid shall include all costs of material sorting, recycling and disposal, including but not limited to handling, hauling, dumping fees and permits, etc.

END OF SECTION 020720

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division I, Specification Sections apply to this Section.

1.2 WORK INCLUDED

A. Miscellaneous hangers, brackets and supports

B. Angle lintels for heads of door openings in CMU walls.

C. Galvanized clip angles and bolts for masonry wall bracing at heads.

1.3 RELATED WORK

A. Section 042000 - Unit Masonry.

1.4 SUBMITTALS

A. Submit shop drawings for all products listed on main schedule. Include identification of primer by proprietary name of formulation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Rolled Steel Structural Sections ASTM A36-84a

B. Primer:

1. Ferrous Metals: ICI DeVoe, 4160-6120 DeVguard 1 coat
2. Galvanized Steel: ICI DeVoe, 4160-6120 DeVguard 1 coat
3. Field touch up of galvanized Materials: Z.R.C. cold galvanizing materials.

2.2 FABRICATION

A. Grind rough edges smooth.

B. Prepare ferrous items for priming as follows:

1. Remove obvious deposits of grease and oil first.
2. Remove loose mill scale, loose black oxide, all rust, all welding flux and spatter and other contaminants by grinding and wire brushing. Do not roughen or burnish metal.
3. Clean entire surface by flooding with clean mineral spirits and wiping dry with clean cloth.

C. Apply primer in thickness recommended by manufacturer. Do not over thin. Avoid runs, sags, and holidays. Brush primer into cracks and joints.

1. Allow primer to dry 72 hours before handling or shipping

PART 3 - EXECUTION

3.1 SCHEDULE

A. Angle Framing for lintels and miscellaneous angles: Prime paint

1. Miscellaneous brackets, supports, anchors, and frames for mechanical and electrical equipment are specified in Division 15 and 16.
2. Provide miscellaneous brackets, supports, anchors, and lintels other than for mechanical and electrical equipment.
3. Hot dip galvanize all lintels in exterior wall construction and prime paint.
4. Miscellaneous Angles

B. Provide miscellaneous anchors and supports as required to complete the project.

C. Provide clip angles and bolts for seismic restraint of new masonry walls as shown on drawings. Clip angles shall be secured to existing concrete ceiling slabs with epoxy set or expansion bolts. Clip angles shall be in pairs and shall be thru bolted together thru the masonry walls. Angles shall be 8" vertical X 6" x 4" long, space 48" oc at vertically reinforced CMU cores.

END OF SECTION 055000

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Pipe and duct supports.
4. Pipe portals.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

D. Delegated-Design Submittal: For roof curbs and equipment supports 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. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.
2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Wind-Restraint Performance: 100 mph.

2.2 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Confab.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) steel sheet, 0.052 inch thick.

1. Finish: Mill phosphatized.

D. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
3. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange.
4. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
5. Insulation: Factory insulated with 1-1/2 inch thick glass-fiber board insulation.
6. Nailer: Factory-installed wood nailer along top flange of curb, continuous around curb perimeter.
7. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
8. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch-thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
9. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.3 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced perimeter metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, and integrally formed structure-mounting flange at bottom.

1. Confab.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) steel sheet, 0.052 inch thick.

1. Finish: Mill phosphatized.

D. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. Nailer: Factory-installed continuous wood nailers 3-1/2 inches wide on top flange of equipment supports, continuous around support perimeter.
3. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb of size and spacing required to meet wind uplift requirements.
4. Platform Cap: Where portion of equipment support is not covered by equipment, provide weathertight platform cap formed from 3/4-inch-thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
5. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
6. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
7. Fabricate equipment supports to minimum height of 12 inches above roofing surface unless otherwise indicated.
8. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.

2.4 PIPE AND DUCT SUPPORTS

A. Fixed-Height Cradle-Type Pipe Supports: Polycarbonate pipe stand accommodating up to 1-1/2 inch diameter pipe or conduit; with provision for pipe retainer and with manufacturer's support pad or deck plate as recommended for penetration-free installation over roof membrane type; as required for quantity of pipe runs and sizes.

2.5 PIPE PORTALS

A. Curb-Mounted Pipe Portal: Insulated roof-curb units with welded or mechanically fastened and sealed corner joints, straight sides, and integrally formed deck-mounting flange at perimeter bottom; with weathertight curb cover with single or multiple collared openings and pressure-sealed conically shaped EPDM protective rubber caps sized for piping indicated, with stainless steel snaplock swivel clamps.

1. Confab.

2.6 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Cellulosic-Fiber Board Insulation: ASTM C208, Type II, Grade 1, thickness as indicated.

C. Glass-Fiber Board Insulation: ASTM C726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Underlayment:

1. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
2. Polyethylene Sheet: 6-mil-thick polyethylene sheet complying with ASTM D4397.
3. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.
4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

F. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

G. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

H. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

E. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.

1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

F. Preformed Flashing-Sleeve and Flashing Pipe Portal Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions; flash sleeve flange to surrounding roof membrane according to roof membrane manufacturer's instructions.

G. Seal joints with butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 079000 - SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including Summary of Work, and Division I, Specification Sections apply to this Section.

1.02 WORK INCLUDED

A. Sealant at joints of dissimilar materials, louvers, CMU control joints where new walls abutt existing, etc and masonry.

B. Sealant at mechanical and electrical penetrations.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 011000 – Summary of Work

B. Section 220500- Common Work Results for Plumbing.

C. Section 230500 - Common Work Results for Mechanical

D. Section 260500 - Common Work Results for Electrical

1.04 SUBMITTALS

A. Submit manufacturer's product data and color chart. Data shall indicate conformity to reference specifications listed below. Include requirements for primers, if any.

1.05 QUALITY ASSURANCE

A. Approved Manufacturers: Products listed are from Dow Corning equal silicone products from the following manufacturers are acceptable.
   1. General Electric
   2. Rhodorsil
   3. Tremco.
   4. Pecora.
   5. DAP.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sealant for interior and exterior uses, control joints, expansion joints, joints between dissimilar material and penetrations in exterior walls. Dow S 56 SMS

B. Primers: As recommended by sealant manufacturer for sealant and building surfaces where used.

C. Joint Backing: Expanded or extruded closed-cell polyethylene for joints in back and joints requiring filler to create proper depth and polyethylene bond breaker tape for joints closed in back.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean surfaces to which sealant is to be applied, Brush off dust. Remove loose materials; wash off grease, oil and other contaminants. Apply primers if required.

3.02 APPLICATION

A. Apply sealant only to dry surfaces on a relatively dry day at temperature of 40 degrees or above.

B. Seal openings in interior and exterior walls, including, joints between different materials and components. Seal both inside and outside. Seal perimeter of all penetrations in new and existing concrete slabs. Note: If the word “caulk” appears on drawings, it means “seals”. Seal around all penetrations in fire rated and non-rated wall assemblies.

C. Apply joint backing to joint open in back or over 1/2 inch deep. Compress backing so as to form a firm stop, which will resist sealant pressure.

D. Drive sealant into joints, filling from the bottom up. Tool joints to produce neat, tightly adhering beads.

E. Clean up spills, using solvent recommended by manufacturer.

END OF SECTION

SECTION 079100 - FIRE SEALING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division I, Specification Sections apply to this Section.

1.2 WORK INCLUDED

A. Provision of fire rated sealant system at all electrical and mechanical penetrations and at tops of new CMU walls and at the vertical joints were new CMU abut existing concrete walls,

1.3 Fire sealant must be a UL approved system. All walls and the structure above them, all penetrations in walls and floors must be sealed with fire rated sealing systems. All walls in the areas of work must provide fire and smoke separation.

A. Fire rated sealant systems at tops of walls, beams, around pipes, ducts, conduit, wiring, and miscellaneous wall penetrations.

1. Smoke penetration sealing at tops of walls, beams, around pipes, ducts, conduit, wiring, and miscellaneous wall penetrations.
2. Separation between rooms at tops of walls, beams, around pipes, ducts, conduit, wiring, and miscellaneous wall penetrations.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. Section 011000 – Summary of Work.

1.5 SUBMITTALS

A. Submit manufacturer's product data and color chart. Data shall indicate conformity to reference specifications listed below. Include requirements for primers, if any.

1.6 QUALITY ASSURANCE

A. Sealant systems for fire caulking and sealing are specified as manufactured by HILTI. Equal products by other manufacturers may be submitted for review in accordance with Specification Section #016000 as substitutions prior to bid. UL approval is required.

B. Approved Manufacturers: Products listed are from Hilti, products meeting the fire, and smoke ratings, UL approved, and designed especially for the uses on the project may be submitted for substitution up to (10) days prior to bidding.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sealant systems around pipe, conduit, duct and other wall penetrations: HILTI FS-ONE high performance fire stop UL classified. HILTI FS 657 FIRE BLOCK, HILTI CP 645 FIRESTOP WRAP STRIP, FS 635 FIRESTOP COMPOUND and CP 618 FIRESTOP PUTTY STICK are also acceptable.

B. Sealant systems around pipe, conduit, duct and other wall penetrations at control and expansion joints and at control and expansion joints in fire rated walls: HILTI CP 601S-ELASTOMERIC FIRESTOP SEALANT.

C. Spray fire sealant to seal joints at tops of fire rated and smoke tight walls and floor to floor where joints contain fire safing insulation: HILTI CP 672 FIRESTOP JOINT SPRAY.

D. Other Hilti products with UL approval may be used for the uses they have been designed notify Engineer when other products are to be used

E. Primers: As recommended by sealant manufacturer for sealant and building surfaces where used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean surfaces to which sealant is to be applied, Brush off dust. Remove loose materials; wash off grease, oil and other contaminants. Apply primers if required.

3.2 APPLICATION

A. Apply sealant only to dry surfaces on a relatively dry day at temperature of 40° F or above.

B. Seal all firestop penetrations, tops of walls and floor penetrations both sides.

C. Clean up spills, using solvent recommended by manufacturer.

END OF SECTION 079100

SECTION 099000 - PAINTING

PART 1 - GENERAL

1.01 REFERENCES

A. Drawings and general provisions of the contract, including Summary of Work, General and Supplementary Conditions and Division I, Specification Sections apply to this Section.

1.02 WORK INCLUDED

A. Preparation, painting and finishing:

1. All new and existing interior paintable surfaces in the areas of work without factory finish such as:

a. Gypsum walls where disturbed by new work, to match existing.
b. Concrete walls, floors and ceilings.
c. Steel lintels, frames.
d. Mechanical, plumbing, piping, hangers, brackets, support devices, and electrical conduit.

B. Preparation includes:

1. Cleaning new and existing surfaces.
2. Sand blasting all existing painted CMU and concrete.
3. Sanding and filling all surfaces.
4. Provision of stain kill where stains occur.
5. Etching galvanized steel.

1.03 RELATED WORK

A. Section 011000 – Summary of Work

B. Section 220500- Common Work Results for Plumbing.

C. Section 230500 - Common Work Results for Mechanical

D. Section 260500 - Common Work Results for Electrical

1.04 REFERENCES

A. ANSI/ASTM D16 - Definitions of Terms Relating to Pain, Varnish, Lacquer, and Related Products.

1.05 DEFINITIONS

A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.06 QUALITY ASSURANCE

A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with three years of experience.

B. Applicator: Company specializing in commercial painting and finishing with three years of experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/fuel/smoke rating requirements for finishes.

B. All paint and finishes shall conform to ANSI A66.1 - 1964, “Specifications to Minimize Hazards to children from residual Coating Materials”.

1.08 SUBMITTALS

A. Submit product data.

B. Provide product data on all finishing products.

C. Submit manufacturer's application instructions.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600

C. Deliver products to site in sealed and labeled containers inspect to verify acceptance

D. Container labeling to include manufacturer's name, type of paint, brand name. Brand code, coverage, surface preparation, drying time, clean up, color designation, and instructions for mixing and reducing.

E. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in well ventilated area, unless required otherwise by manufacturer's instructions.

F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.10 ENVIRONMENTAL REQUIREMENTS:

A. Provide continuous ventilation and heating facilities to maintain surfaces and ambient temperature above 45 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.

C. Minimum Application Temperature for Latex Paints: 45 degrees F interiors; 50 degrees F exterior, unless required otherwise by manufacturer's instruction.

D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft. candles measured mid-height at substrate surface.

F. Protection:

1. Cover or otherwise protect finish work of other trades and surfaces not being painted concurrently or not to be painted.

1.11 EXTRA STOCK

A. Provide a one-gallon container of each type finish paint to Owner. Do not provide extra stock of primers.

B. Label each container with color and room locations, in addition to the manufacturer's label.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Except as otherwise specified, materials shall be the products of the following manufacturers:

1. ICI Paint Stores
2. Olympic
3. PPG Industries
4. Benjamin Moore Co.

5. Pratt & Lambert
6. Sherwin Williams
7. Tnemec

B. Materials selected for coating systems for each type surface shall be the product of a single manufacturer.

2.02 MATERIALS

A. Products specified are as manufactured by ICI, unless otherwise indicated, similar products of acceptable manufacturers listed in Article 2.01 may be furnished in lieu of those listed. Contractor shall list products of other manufacturers on this schedule, provide product data and be responsible for compatibility of each system and substrate.

B. Coatings: Ready mixed, except field-catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coatings.

C. Coatings: Good flow and brushing properties, capable of drying or curing free of streaks and sags.

D. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but not required to achieve the finished specified, of commercial quality.

PART 1 - EXECUTION

3.01 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

3.02 PREPARATION

A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.

B. Correct minor defects and clean surfaces which affect work of this Section.

C. Previously painted CMU and concrete surfaces: Lightly sand blast all previously painted CMU and concrete surfaces to provide tooth for new application.

D. Previously painted interior faces of foundation walls damaged by water intrusion: Remove all paint and all previous coatings to clean concrete, sand blast entire surface, medium blast.

E. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow drying.

F. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt and rust. Where heavy coatings on scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Spot prime paint after repairs.

G. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime metal items including shop painted items.

H. Unprimed Galvanized Steel;

1. Remove obvious deposits of grease and oil.
2. Flood with white vinegar, wet entire surface, let stand five minutes, repeat three times.
3. Remove vinegar residue with clean rags and clean water.
4. Dry surfaces with clean rags.
5. Clean entire surface by flooding with clear mineral spirits and wiping dry with clean cloths, repeat one more time.
6. Apply etching primer.

3.03 PROTECTION

A. Protect elements surrounding the work of this Section from damage or disfiguration.

B. Remove damage to others surfaces caused by work of this Section.

C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

3.04 APPLICATION

A. Apply products in accordance with manufacturer's instruction.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish.

D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

E. Sand lightly and vacuum and/or wipe with tack cloths between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

3.05 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Division 23 and Division 26 for schedule of color-coding and identification banding of equipment, ductwork, piping, and conduit.

B. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts hangers, brackets, collars and supports, except where items are prefinished.

C. Replaced identification markings on mechanical or electrical equipment when painted accidentally.

D. Paint exposed conduit and electrical equipment.

E. Paint both sides and all edges of plywood backboards of electrical and telephone equipment before installing equipment.

F. Color code equipment, piping conduit, and exposed ductwork as directed in the field. Color band and identify with flow arrows and names.

G. Replace electrical plates, hardware, light fixture trim, and fittings; remove prior to finishing.

3.06 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Collect cotton waste, cloths and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.07 PAINT SCHEDULE

A. Exterior and interior Galvanized Metal: (Gloss) paints scheduled are manufactured by ICI, equal materials from the listed manufacturers are acceptable.

1.	Primer: 4160-6120 DeVguard	1 coat
2.	Finish: 2518 Ultra-Hide Durus	2 coats

B. Interior Gypsum:

1.	Primer: ULTRA-HYDE PVA interior primer sealer	1 coat
2.	Finish: Lifemaster 2000 VOC 0g/1	2 coats

C. Concrete walls and unpainted concrete ceilings and walls:

1.	Primer & Finish: Tenemc - TYPOXY Series 27B - OOWH TNEMIC WHITE	2 coats

D. Concrete floors:

1.	Primer: Tenemc - SEries 201 Epoxoprime	1 coat
2.	Finish: Tenemc - Series 210 EVEN FLOW SL	1 coat

E. Interior Ferrous Metals - (Semi Gloss)

1.	Primer: Devflex 4020 8502/8520	1 coat
2.	Finish: Speedwall 1456 XXXX	2 coats

3.08 COLORS

A. Colors and finish are to match existing adjacent areas or be selected by the Owner.

END OF SECTION 099000

SECTION 220500 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 REFERENCES

A. Refer to the SUMMARY OF WORK, and applicable parts of DIVISION 1 for other general requirements. These requirements may be repeated in this Division for emphasis or for inclusion of more stringent/additional related requirements. Such repetition shall NOT be construed to reduce the requirements of those Divisions NOR to eliminate other requirements under those Divisions.

B. The requirements of this Section apply to ALL work specified in this Division, unless modified to be of higher quality or more stringent in another Section.

1.2 INTENT

A. The CONTRACT DOCUMENTS are inclusive of all Drawings and Specifications, both those specifically covering the work of this Division and those covering other subjects of work.

B. It is the intent of the Contract Documents to require finished work, tested and ready for operation.

C. It is not intended that Contract Documents show every pipe, wire, conduit, fitting and appurtenance; however, such parts as may be necessary to complete the systems in accordance with best trade practice and Code requirements and to Engineer's satisfaction shall be deemed to be included.

D. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. DO NOT SCALE THE DRAWINGS.

1.3 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Before submitting prices or beginning work, thoroughly examine the site and the Contract Documents.

B. No claim for extra compensation will be recognized if difficulties are encountered which would have been revealed by examination of site conditions and Contract Documents prior to executing Contract.

C. Where discrepancies occur within Contract Documents, notify Engineer, in writing, of discrepancy and request clarification. Until notified of Engineer's decision, include item or arrangement of better quality, greater quantity or higher cost in Contract price.

D. For material, device and equipment identified on Contract Drawings by manufacturer and/or model: Coordinate with Specification for ancillary requirements and include with furnished item.

E. Notify Engineer, in writing, of materials and apparatus believed to be omitted, inadequate or unsuitable, or in violation of laws, ordinances, rules or regulations of authorities having jurisdiction. In absence of such written notice, it is mutually agreed that bid price for work under each Section has included the cost of items required for acceptable satisfactory functioning of entire system.

1.4 DEFINITIONS

A. Where more than one material, item, or grade is listed in same paragraph, first one named is preferred choice.

B. The following terms are used in this Division and are defined as follows:

1. "Indicated", "shown", "noted", "scheduled", "specified": These terms are a cross-reference to graphics, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements in Contract Documents. NO limitation of location is intended except as specifically noted.
2. "Directed", "requested", "authorized", "selected", "required", "permitted": Where not otherwise explained, these terms mean "directed by the Engineer", "requested by the Engineer", etc. However, NO such implied meaning will be interpreted to extend the Engineer's responsibility into Contractor's area of construction supervision or means and methods.
3. "Provide": To furnish and install, ready for safe and regular operation the item, material or service indicated.
4. "Furnish": To purchase, acquire and deliver to the site, complete with related accessories.
5. "Install": To erect, mount and connect completely, by acceptable methods.
6. "Work": Labor, materials, equipment, apparatus, controls and accessories required for proper and complete installation.
7. “Finished Spaces”: Spaces other than the following:

    a. Mechanical and electrical equipment rooms.
    b. Furred spaces.
    c. Pipe and duct shafts.
    d. Unheated spaces immediately below roof.
    e. Spaces above ceilings.
    f. Unexcavated spaces.
    g. Crawl spaces.
    h. Tunnels.

8. “Exposed”, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical or electrical equipment rooms.
9. “Exposed”, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

10. “Concealed”, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in shafts.
11. “Concealed”, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated structures.
12. "Acceptable equivalent" or "Equal": Of weight, size, design, capacity and efficiency to meet requirements specified and shown, and of acceptable manufacture, as determined in the opinion of the Engineer.
13. "Acceptable": Acceptable, as determined in the opinion of the Engineer.
14. "Contractor": General Contractor, Trade Contractor, sub-Contractor, or Construction Manager.
15. "Named" Product: Manufacturer's name for product, as recorded in published documents of latest issue as of date of Contract Documents. Obtain Engineer's permission before using products of later or earlier model.

1.5 STANDARDS

A. Standards, specifications and tests of following technical societies, organizations and governmental bodies, as referenced in Contract Documents, are hereby made part of Contract Documents.

1. ANSI: American National Standards Institute
2. ASTM: American Society for Testing and Materials
3. EPA: Environmental Protection Agency
4. FSSC: Federal Specification
5. IRI: Industrial Risk Insurers
6. ISO: Insurance Services Office
7. NBS: National Bureau of Standards
8. NEC: National Electrical Code.
9. NEMA: National Electrical Manufacturers Association
10. NFPA: National Fire Protection Association
11. NSC: National Safety Council
12. OSHA: Occupational Safety and Health Administration
13. UL: Underwriters Laboratories
14. AABC: Associated Air Balance Council
15. ACGIH: American Conference of Governmental Industrial Hygienists
16. ADC: Air Diffusion Council
17. AGA: American Gas Association
18. AMCA: Air Movement and Control Association
19. API: American Petroleum Institute
20. ARI: Air Conditioning and Refrigeration Institute
21. ASCE: American Society of Civil Engineers
22. ASE: Association of Safety Engineers
23. ASHRAE: American Society of Heating, Refrigeration and Air Conditioning Engineers
24. ASME: American Society of Mechanical Engineers
25. ASPE: American Society of Plumbing Engineers
26. AWS: American Welding Society
27. AWWA: American Water Works Association

28. CGA: Compressed Gas Association
29. CSA: Canadian Standards Association
30. CISPI: Cast Iron Soil Pipe Institute
31. EJMA: Expansion Joint Manufacturing Association
32. FM: Factory Mutual Engineering Division
33. HIS: Hydraulic Institute Standards
34. IBR: Institute of Boiler and Radiator Manufacturers
35. MCAA: Mechanical Contractors Association of America
36. NEBB: National Environmental Balancing Bureau
37. NOFI: National Oil Fuel Institute
38. SBI: Steel Boiler Industry (Division of Hydronics Institute)
39. SMACNA: Sheet Metal and Air Conditioning Contractors National Association
40. STI: Steel Tank Institute
41. CODE: Codes and regulations of the Federal, State and local governments and of utility companies having jurisdiction, as appropriate.
42. CODE: Codes and regulations of the Federal, State and local governments and of utility companies having jurisdiction, as appropriate.

B. Use of singular or plural reference form in the Contract Documents shall not be construed to limit number of units required. Specifications are intended to define quality and performance characteristics; quantity of units supplied shall be as needed to meet requirements as specified and at a minimum, as shown on Contract Documents.

1.6 PERMITS, LAWS, ORDINANCES AND CODES

A. Contractor shall obtain and pay for permits, inspections, licenses and certificates required for work under this Division.

B. Complete Utility connections as indicated or needed, extension to Project, metering as required, and connection to building systems, including:

1. Apply for all services and pay for all fees, assessments and charges of the Utility for each connection, all in a timely manner and according to the Project Schedule.
2. Provide and install all metering equipment and accessories as required by Utility. Install entire service in accordance with the Utility's requirements or other applicable regulation.
3. Coordinate with Utility to determine scope of work provided by Utility and the part provided by Contractor so that a complete Utility connection is made.
4. Schedule all work required by utility companies in order to maintain project schedule.

C. Contractor shall pay utility company charges associated with work of this Division.

D. Contractor shall comply with laws, ordinances, rules and regulations of Local, State and Federal authorities having jurisdiction; and shall comply with rules and regulations of National Board of Fire Underwriters, National Electrical Code and local utility companies.

E. Contract Documents shall govern whenever they are more stringent than Code requirements.

1.7 COORDINATION DRAWINGS

A. Before materials are purchased or work is begun, prepare coordination drawings showing relationship of work among all trades.

B. Submit completed and signed coordination drawings to the Engineer for review.

C. Coordination drawings are for use by Contractors and Engineer during construction and are not replacements for shop, as built, or record drawings required elsewhere in the Contract Documents

1.8 SHOP DRAWING SUBMITTALS

A. General

1. Prior to submission of specific shop drawings, submit for review a preliminary list of intended or proposed manufacturers for all items for which shop drawings are required.
2. Submit through contractual channels for review.
3. Number of copies as directed in DIVISION 1, but not less than 6.

B. Shop Drawings

1. Shop drawings shall include the following information:

a. Descriptive and product data necessary to verify compliance with Contract Documents.
b. Manufacturer's specifications including materials of construction, metal gauge, thickness, and finish.
c. Certified dimensional drawings including clearances required for maintenance or access.
d. Performance data, ratings, operating characteristics, and operating limits.
e. Operating points on curves.
f. Electrical ratings and characteristics.
g. Wiring and control diagrams, where applicable.
h. Certifications requested, including UL label or listing.
i. List of accessories which are required but are NOT being furnished by the product manufacturer or are NOT being provided by this Section. Identify the Section(s) by which the accessories are being furnished or provided.

2. Clearly mark submittals with the following:

a. Where equipment is specified, as follows:

1) Specifications: Section and paragraph.
2) Drawings: Drawing number, schedule, note, and detail, as required.

b. Equipment or fixture identification corresponding to that used in Contract Documents.

c. Accessories and special or non-standard features and materials, which are being provided.

3. The selection and intention to use a product specified by name shall NOT excuse the need for timely submission of shop drawings for that product.
4. For samples submitted in lieu of shop drawings, submit as follows:

a. Submit samples in duplicate.
b. Clearly identify the samples.
c. All samples that are not accepted will be returned.
d. For samples that are approved, one sample will be returned and one sample will be kept by the Engineer.

5. Upon completion of shop drawing review, shop drawings will be returned, marked with one of the following notations: Furnish as Submitted, Furnish as Corrected, Revise and Resubmit, Rejected, or Submit Specified Item. Use only products whose shop drawings are marked Furnish as Submitted or Furnish as Corrected.

C. Other Submittals

1. Refer to Sections of this Division for additional submittal requirements relating to specific equipment or systems.

D. Submission of shop drawings of an unnamed manufacture or shop drawings at variance with the Contract Documents is NOT a proper request for substitution.

E. Repeat submission of products without addressing all comments from prior review will be returned to the Contractor without review for correction. Note:

1. Contractor may be liable for additional efforts expended by the Engineer
2. Contractor WILL be liable for impact to project schedule.

F. Test reports are to be submitted to Engineer for review prior to acceptance of equipment or systems for beneficial use.

1.9 PRODUCT SELECTION

A. Options for selecting products are limited by Contract Document requirements and governing regulations and are NOT controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are NOT necessarily limited to, following specifying methods in Contract Documents:

1. Single Product Manufacturer Named: Provide product indicated.
2. Two or More Manufacturers' Products Named: Provide one of the named products, at Contractor's option, but excluding products which do NOT comply with requirements.
3. "Acceptable equivalent" or "Or Equal": Where named products are accompanied by this term or words of similar effect, provide one of named products or propose substitute product according to paragraph 1.10, SUBSTITUTIONS.

4. Standards, Codes and Regulations: Where specification requires only compliance with a standard, code or regulation, Contractor may select any product which complies with requirements of that standard, code or regulation.
5. Performance Requirements: Provide products which comply with specific performances indicated and which are recommended by manufacturer (in published product literature or by individual certification) for application intended. Overall performance of product is implied where product is specified with only certain specific performance requirements.
6. Prescriptive Requirements: Provide products which have been produced in accordance with prescriptive requirements using specified materials and components, and complying with specified requirements for fabricating, finishing, testing and other manufacturing processes.
7. Visual Matching: Where matching with an established material is required, Engineer's judgment of whether proposed product matches established material shall be final.
8. "Color as Selected by Engineer": Unless otherwise noted, where specified product requirements include "color as selected by Engineer" or words of similar effect, the selection of manufacturer and basic product complying with Contract Documents is Contractor's option and subsequent selection of color is Owner’s option.

B. Inclusion by name, of more than one manufacturer or fabricator, does NOT necessarily imply acceptability of standard products of those named. All manufacturers, named or proposed, shall conform, with modification by manufacturer as necessary, to criteria established by Contract Documents for performance, efficiency, materials and special accessories.

1.10 SUBSTITUTIONS

A. Contractor's request for substitution may be submitted only after award of Contract. Requests shall be in writing and presented through appropriate contractual channels.

B. Substitution Request to include the following:

1. Detailed comparison of significant differences in quality, construction, performance, features, options, and appearance between specified item and proposed substitution. Citation, where applicable, to where a specified requirement is located in the Contract Documents is to be provided.
2. Statement of effect on construction time, coordination with other affected work, and cost of work.
3. Contractor's statement to the effect that proposed substitution will result in overall work equal to, or better than, work originally intended.

C. Substitution requests will be considered based on all of the following:

1. If extensive revisions to Contract Documents are NOT required.
2. If changes are in keeping with general intent of Contract Documents.
3. If submitted in timely and proper manner, fully documented.
4. If one or more of following conditions is satisfied; all as judged by Engineer:

a. Where request is directly related to "acceptable equivalent" clause, "or equal" clause or words of similar effect in Contract Documents.

b. Where specified product, material or method CANNOT be provided within Contract Time; but NOT as a result of Contractor's failure to pursue the work promptly or properly coordinate Contractor's efforts.
c. Where substantial advantage is offered Owner; in terms of cost, time, energy conservation or other valuable considerations; after deducting offsetting responsibilities that Owner may be required to bear, including additional compensation to Engineer for redesign and evaluation services, increased cost of other work by Owner or separate contractors, and similar considerations.

D. The burden is upon the Contractor, supplier and manufacturer to satisfy Engineer that:

1. Proposed substitute is equal to, or superior to, the item specified.
2. Intent of the Contract Documents, including required performance, capacity, efficiency, quality, durability, safety, function, appearance, space clearances and delivery date, will be equaled or bettered.

E. Submission of shop drawings of unspecified manufacture or shop drawings at variance with the Contract Documents is NOT a proper request for substitution.

F. Changes in work of other trades, such as structural supports, which are required as a result of substitution and the associated costs for such changes shall be the complete responsibility of Contractor proposing substitution. Except as noted in subparagraph 1.10.C.4 (a) above, there shall be NO additional expense to the Owner.

G. Substitution requests that require the Engineer to expend additional efforts for review, investigation, verification, or similar activities, will require the Contractor to compensate the Engineer at the rate of $120/hr if:

1. Engineer is not familiar with the proposed manufacturer or the proposed product from that manufacturer.
2. Engineer needs to investigate proposed product, attend presentations, confer with other professionals, contact references, or similar activities that would not otherwise have been required if one of the named products was proposed.
3. Engineer must travel to the manufacturer's facilities or a representative installation of the proposed product to review, confirm, or assess product characteristics or directly communicate with manufacturer's representatives on technical or product support subjects.

1.11 SAMPLES

A. Submit samples where required or referenced elsewhere in this Division of work.

B. Where in the opinion of the Engineer, a sample is required to clarify the acceptable characteristics of a material or product, additional samples may be required.

1.12 RECORD DRAWINGS

A. Furnish and keep on the job at all times, a minimum of one complete and separate set of Contract Documents for the purpose of tracking installation of the work.

B. As work progresses, record changes, revisions and additions to the work clearly, neatly, accurately and promptly. Items to be indicated include but are not limited to:

1. Dimensional change of equipment or material
2. Revision to Drawing Detail
3. Location and depth of underground utilities, structures, equipment, tanks, etc - referenced from project benchmarks
4. Location and depth of underslab utilities and distribution
5. Actual routing of distribution systems
6. Revision to power or control wire circuiting/source
7. Actual equipment location
8. Location of concealed distribution work such a pipes, conduits, ducts, etc
9. Location of concealed work and access panels, where access for maintenance or service is required.
10. Changes made by Change Order
11. Details not on original Contract Drawing, but used for installation of the work.
12. Information on concealed elements which would be difficult to identify or measure later.
13. Valve locations and numbers reflecting the final valve tag charts.

C. Indicate daily progress on these prints by coloring in the various lines, fixtures, apparatus and associated appurtenances as they are erected.

D. Approval of requisition for payment for work installed will NOT be given unless supported by record prints as required above.

E. At the conclusion of work, prepare final record drawings reflecting all field recorded data, neatly transferred from documents used in the field to a clean paper set of the Original Contract Documents. Submit record drawings for review by Engineer. After review and acceptance, the Contractor will be furnished with an electronic set of the original contract documents to be edited to reflect modifications and field data as reported on record drawings. Electronic copy of final “as-built” contract documents to be provided to the Owner in a format agreed upon at the commencement of work.

F. Coordination Drawings are to be updated, reflecting installation of work that differs from that presented on the Coordination Drawings which were signed off at the start of work. All trades will review and sign off on these documents as accurate. Electronic copy of final “as-built” coordination drawings to be provided to the Owner in a format agreed upon at the commencement of work.

G. Refer to DIVISION 1, GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS for further requirements.

1.13 OPERATING AND MAINTENANCE MANUALS

A. Submit for review, at least two (or greater quantity if otherwise specified in Division 1), operating and maintenance (O&M) manuals for each system or piece of equipment. Applicable content, as generated, is to be collected continuously during the construction process and maintained in a DRAFT manual format for review by the Engineer at any time.

B. Completed manual will be reviewed by the Engineer and modifications made as identified, before distribution or use. Acceptance will be required prior to scheduling of Owner Training and Instructions.

C. Required modifications identified during Training and Instruction activities are to be made before final Manual is delivered to the Owner.

D. Refer to DIVISION 1 for additional requirements and procedures relating to O&M manuals.

E. Operating and maintenance manual(s) will be organized with the following fundamental content:

1. Table of Contents and Index

2. Project Information

   a. Contractor name, address, contact information, and primary contact individual specific to this project
   b. Sub-contractor names, responsibility, address, contact information, and primary contact individual specific to this project.
   c. Summary description of project scope and period of time work was executed.

3. Guarantees and Warrantees

   a. Documentation describing covered work/materials, effective coverage dates, and terms/conditions
   b. Contact information for initiating a claim and responsible party

4. Each Major Building System

   a. Supplier information including

      1) Technical Support contact
      2) Source of parts / replacement units
      3) Chain of purchase (Supply house, manufacturer’s sales vendor, sub-contractor, etc), including Original order number/identification for tracking purposes

b. Operating Instructions

1) Prepared specific for this project

a) System Description
b) Operating parameters
c) Adjustable settings and purpose
d) Warnings and cautions
e) Sequence of Operations and Control Diagrams

2) Description of training and instruction provided to Owner including:

a) Date(s) of instruction/training
b) Agenda
c) Attendee list

c. Maintenance Instructions

1) Prepared specific for this project

a) Preventative maintenance schedule
b) Summary of consumable materials / regularly replaced elements
c) Recommended stocking materials and specialized tools or equipment necessary to perform regular and preventative maintenance
d) Maintenance contracts secured under this project, or separately contracted for through this provider.

d. Commissioning and Test Reports

1) Documentation of all inspection and testing activities performed with associated reports and corrective measures undertaken (if applicable).
2) Factory test reports
3) Certification letters for equipment manufacturers attesting to the complete and satisfactory installation and operation of systems/products.
4) Seismic inspection and certification
5) Special inspections
6) Sign off by Authorities Having Jurisdiction
7) Air and water balance report.

e. Parts / Material List

1) Bill of materials for each system or piece of equipment

f. Product Literature

1) Copy of shop drawings reflecting final acceptance by Engineer, with modifications made reflecting changes to the installed work which is not represented accurately.

g. Manufacturer's Operation & Maintenance Literature

1) Materials provided with equipment/products shipped for use on project
2) Supplementary materials which are required to provide the Owner with a complete representation of manufacturer's instructions and recommendations.

F. In addition to the above, the following Content is to be included in the Operation & Maintenance Manual(s):

1. BMS and temperature control shop drawings.
2. HVAC testing and balancing reports.
3. Commissioning and testing reports.
4. Other data, as required under pertinent Sections of these Specifications.

1.14 GUARANTEE

A. Furnish standard manufacturers' guarantees for work under this Division. Such guarantees shall be in addition to, and NOT in lieu of, other liabilities under the law or by other provisions of the Contract Documents.

B. Materials, equipment and workmanship shall carry the standard warranty against defects in material and workmanship. Failure which may develop due to defective or improper material, equipment, workmanship or design shall be made good, forthwith, by and at the expense of the Contractor, including damage done to areas, materials and other systems resulting from this failure.

C. Guarantee that all elements of the systems are of sufficient capacity to meet the specified performance requirements as set forth in Contract Documents.

D. Upon receipt of notice from Owner of a failure of system(s) or component(s) during the guarantee period, replace affected components within reasonable time period at no additional cost.

E. Guarantee period shall extend for one year from Date of Substantial Completion.

F. Before final request for payment, furnish written guarantee covering above requirements.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

A. Products shall be undamaged and unused at time of installation and shall be complete with accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use.

B. Where available, products shall be standard products of types which have been produced and used previously and successfully on other projects and in similar applications.

C. Labels and Stamps

1. Locate labels and stamps required to be observed after installation on accessible surfaces. In occupied spaces, select locations that are not conspicuous.
2. Locate labels and stamps not required to be observed after installation on concealed surfaces.

D. Provide corrosion resistant fasteners of galvanized or stainless construction where exposed to moist corrosive conditions. Including but not limited to tunnels, manholes, greenhouses and exterior to the building.

PART 3 - EXECUTION

3.1 ARRANGEMENT OF WORK

A. Consult Architectural Contract Drawings and Details for exact locations of fixtures and equipment. If exact location is not given, obtain information from Engineer. Verify measurements in field. Base measurements on Engineer's established benchmarks.

B. Install work as closely as possible to layouts shown on Contract Drawings. Modify work as necessary to:

1. Provide maximum possible headroom and space clearance on each side.
2. Provide adequate clearance and ready access to all parts of the work, for inspection, operation, safe maintenance and repair, and code conformance.
3. Coordinate and arrange work to avoid conflicts with work of other trades, to avoid unnecessary cutting and patching, and as needed for satisfactory space conditions shown on coordination drawing submittals.
4. Where space appears inadequate, consult Engineer before proceeding with installation.

C. Coordinate installation of required supporting devices.

D. Set sleeves in cast-in-place concrete for services that will need to pass through concrete. Coring of installed concrete is not intended and the Contractor will be responsible for determining the impact on structural integrity, certifying that there will be no impact, and any remedial work required to accommodate impact from coring.

E. Work shall present a neat coordinated appearance.

3.2 COORDINATION

A. Examine Contract Documents and coordinate with Contractor and other trades as necessary to facilitate the progress of the work.

B. Each trade shall keep Contractor and other trades fully informed as to shape, size, and locations of openings, chases, equipment, panels, access doors, sleeves, inserts and anchor bolts required; whether temporary or permanent. Coordinate sizes, depths, fill and bedding requirements with excavation trades. Give sufficient advance notice so that coordination may be completed in advance. If information is not furnished in proper and timely fashion, the trade involved shall do own cutting and patching or have same done by Contractor, without additional cost to Owner.

C. Coordinate size and location of concrete bases with DIVISION 3 and the following:

1. Floor Drains and underslab utilities
2. Dimensional requirements for embedded anchors as necessary for support, vibration isolation, and seismic restraint.
3. Access and walkway requirements
4. Work of other trades

D. Particular emphasis is placed on timely installation of major apparatus and furnishing of other trades and Contractor with relevant information.

E. Do NOT install a system until critical components of system and related systems have been coordinated and applicable shop drawings have been accepted.

3.3 WORKMANSHIP

A. Work covered under this Division shall be constructed and finished in every respect in a workmanlike and substantial manner.

B. Equipment and materials shall be new, of first quality, selected and arranged to fit properly into spaces indicated.

C. Obtain detailed information from manufacturer as to proper methods for installation and connections. This includes such tests as equipment manufacturer recommends. Where documentation regarding installation is NOT obtainable, work shall be installed in accordance with best trade practice.

1. Unless specifically indicated otherwise on Contract Documents, equipment and materials shall be installed in accordance with manufacturer's recommendations.
2. Notify Engineer of conflicts between manufacturer's recommendations and Contract Documents requirements, and request clarification before proceeding with installation.

D. Where equipment, piping, ductwork, conduit, etc. is exposed, color of finish or paint shall be as selected by Engineer.

3.4 OPERATION OF SERVICES AND UTILITIES

A. During the construction period and until finally inspected, tested and accepted, maintain new services and utilities.

B. Shutdown of existing services and utilities shall, without exception, be coordinated with the proper utility and with the Owner as to date, time of day, and duration.

1. Notify Engineer and Owner of estimated duration of shutdown period at least ten days in advance of date when shutdown is proposed. Approval of shutdown shall be obtained from proper utility and Owner, before any service is interrupted.
2. Work during shutdown period shall be arranged for continuous performance, including overtime if required, to ensure that existing operating services will be shut down only for time actually necessary to complete connections.

3.5 PROTECTION

A. Contractor shall be responsible for work and equipment until fully inspected, tested and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material or damaging water.

B. Equipment shall be protected against damage while in storage either on or off the construction site. The equipment shall be stored in a dry environment with temperature and controlled to within ranges specified by the manufacturer. Space heaters shall be installed and energized when required to control humidity. Store light sensitive materials where not subjected to direct sunlight.

C. Protect work and material of other trades from damage that might be caused by work of this and other Divisions and correct damage thus caused.

D. Maintain protective measures used for transport of equipment or materials to project site until ready to set and connect utilities and related work. If protective covers need to be removed for inspection or coordination of work, repair or replace to equivalent.

3.6 IDENTIFICATION

A. Distribution systems such as pipes, tubing, conduits, sheetmetal, insulation, etc shall have following information clearly printed on the material: manufacturer's name, material grade, gauge, thickness, type, and data to identify required methods of attachment; as applicable. Unmarked material shall NOT be used.

B. Permanent nameplates shall be provided on each piece of service-connected, power-operated, or distribution equipment, on easily accessible surface. Nameplate shall include product name, model number, serial number, capacity, speed, ratings, and similar essential operating data.

1. Manufacturer's nameplate, name, trademark and address shall be attached permanently to equipment and material furnished. Nameplate showing distributor or Contractor will NOT be permitted.
2. Unless otherwise specified or requested, letters and numbers shall be 1/2O high.
3. Attach nameplates with screws or rivets. Wherever covers of adjacent units are interchangeable, attach nameplates to wall or backboard rather than covers.

C. Unless specified elsewhere in this Section, labels shall be provided to indicate equipment according to designations used in Contract Documents. Label shall be plastic nameplate with letters and numbers 1-1/2O high. Furnish directory indicating number, location and use of each item. After finish painting is completed, apply identification label where it will be readily visible from normal operating position on floor.

3.7 LUBRICATION

A. Equipment shall be furnished and installed so that lubrication points are conveniently and readily accessible for maintenance. Make these provisions by whatever means is appropriate: extended fittings, access doors, equipment location, etc.

B. No equipment shall be operated for temporary service or for testing purposes without proper lubrication. Items requiring lubrication shall be left freshly and fully lubricated at time of substantial completion.

C. Prior to substantial completion, deliver to Owner, along with itemized list: one complete new set of special lubrication devices required for servicing, such as grease guns, fittings and adapters.

3.8 ATTACHMENT OF SUPPORTS TO BUILDING STRUCTURE

A. Equipment shall be securely attached to building structure in acceptable manner. Attachments shall be of strong and durable nature as determined by Engineer.

B. Attachment of supports to roof decking is NOT permitted. Pipes, ducts, conduits, boxes, etc. must be supported from building structural framing (bar joist, beams, columns) or by supplementary members installed by the Contractor, spanning structural framing in a method acceptable to the structural engineer.

C. Cut, Fit and place miscellaneous metal supports for installation of work.

D. Field Welding: Comply with AWS D1.1 or other applicable standards

E. Refer to DIVISION 5 for material specification of supplemental members to be installed.

3.9 ACCESSIBILITY, ACCESS PANELS AND ACCESS DOORS

A. Locate equipment which must be serviced, including motor starters, switches, panels and junction boxes, in accessible locations if at all possible. For other locations, furnish access panels as described under DIVISION 1.

B. Access doors shall be located to conveniently serve intended purpose and shall be installed so that adjacent piping, equipment and structures do NOT render doors unusable.

C. Access doors are not required in removable panel ceilings if suitable identifying markers are provided to indicate access locations.

D. During project closeout, Contractor shall perform walk-through identifying and demonstrating access to equipment for service and/or replacement. Walk-through shall be arranged at times convenient for Engineer and Owner to attend.

1. Equipment with insufficient access shall be relocated or provided with additional access panels at no additional cost to Owner.
2. Trade responsible for access problem shall be responsible for costs of access modifications. In general, this shall be understood to be the trade installing the equipment. If access problem was caused by architectural layout changes which occurred subsequent to equipment installation, cost of access modifications shall be borne by trade responsible for architectural changes.

3.10 WATERPROOFING

A. Where work pierces waterproofing, including waterproof concrete and floor of a wet area, submit method of installation for review by the Engineer before work is done.

B. Provide necessary sleeves, caulking and flashing required to make openings waterproof. See DIVISION 7 on WATERPROOFING.

3.11 GROUTING

A. Mix and install grout for equipment base bearing surfaces, base plates, and anchors

3.12 BASES AND SUPPORTS

A. Unless noted otherwise, provide necessary supports, rails, framing, bases and piers required for equipment furnished or installed under this Division.

B. Unless otherwise indicated: floor-mounted equipment shall be mounted on concrete pads. Concrete and associated reinforcing materials shall be as specified in DIVISION 3, CONCRETE.

1. Pads shall be three-inch thick minimum. Pads for seismically supported equipment shall extend at least 6 inches beyond equipment footprint. Coordinate final extension requirements with approved seismic shop drawing calculations and details. All other pads shall NOT extend more than one inch beyond equipment footprint. Top edge of pads shall be chamfered.
2. Furnish dimensional and load information so that shop drawings for pads may be submitted and reviewed prior to pad installation.
3. Equipment shall be firmly grouted into concrete pads and anchor bolted.

C. Where mounted on the floor: Foundations, supports, pads, bases and piers shall be of the same finish quality as the adjacent flooring material.

D. Equipment supports shall be designed and constructed so that equipment will be capable of resisting both vertical and horizontal movement. Refer to Section "VIBRATION AND SEISMIC CONTROLS" In this Division.

3.13 PAINTING

A. Unless otherwise specified, materials furnished under this Division shall have prime coat and standard manufacturer's finish.

B. Finish painting of exposed work and equipment is covered under DIVISION 9.

C. Paint equipment and appurtenances in concealed and unfinished areas with one coat of rust-inhibiting paint or with an appropriate bitumastic protective product designed for the intended application. Asphalt paint is NOT acceptable. Items to be painted shall include, but not be limited to: non-insulated hangers, supports, piping, conduit, tanks and other ferrous metal work, which are concealed or inaccessible but not galvanized.

D. Special care shall be taken to avoid painting or spattering equipment nameplates.

E. Cooperate in identifying systems for painters. Refer to paragraph, IDENTIFICATION.

3.14 TESTS - GENERAL

A. Make final adjustments to equipment before testing. Manufacturer's authorized representative shall verify proper installation and adjustment prior to startup of major equipment; refer to paragraph, OPERATING AND MAINTENANCE MANUALS.

B. Furnish labor, materials, instruments, supplies and services necessary for testing required under this Division. Correct defects appearing during tests, and repeat tests until no defects are disclosed. Final tests shall be made in Engineer's presence.

C. Use true RMS ammeter to measure current, for equipment which may have harmonic (non-linear) load component.

D. Notify Owner and Engineer of testing schedule at least (48) hours in advance of tests.

E. Perform specified tests and tests required by legal authorities and by agencies having jurisdiction over this Work. Tests shall be performed to the satisfaction of legal authorities, agencies having jurisdiction, and Owner.

F. Each piece of equipment, including motors and controls, shall be operated continuously for minimum test period of one hour.

G. If manufacturer's startup services are specified under other Sections in this Division, furnish services of factory-trained service engineering representative to provide following. If manufacturer's startup services are not required, Contractor shall furnish following services.

1. Inspection of equipment/system installation.
2. Assistance in initial startup and adjustment of equipment; including necessary time to achieve proper installation and adjustments.
3. Instruction of Owner's staff; see paragraph, INSTRUCTIONS.

H. Upon completion of tests, demonstrate the following:

1. Equipment and systems are installed and operating in accordance with manufacturer's specifications and instructions and with Contract Documents.
2. Proper adjustment of equipment and systems.
3. Systems are properly cleaned and free of contaminants.
4. Systems are properly phase balanced.
5. Circuits and motorized equipment are equipped with proper overload protection and are not operating under overload.
6. Instruments are recording properly.

I. Refer to testing requirements in other Sections of this Division for addition work.

3.15 INSTRUCTIONS

A. Arrange for each installer of work requiring continuing maintenance or operation, to meet with Owner's personnel at project site and instruct them in the operation and maintenance. Include instruction by manufacturer's representatives where installers are not expert in the required procedures. Instruction periods for all trades shall be minimum of 8 hours total; refer to individual SECTIONS for further requirements.

B. Instructions include, but are not limited to, the following:

1. Review of Operation and Maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuels, identification system, control sequences, hazards, cleaning, and similar procedures and facilities.
2. Demonstration of the following:

    a. Start up procedures
    b. Shutdown procedures
    c. Emergency operations
    d. Noise/vibration control adjustments
    e. Safety concerns and protective equipment
    f. Economy/efficiency adjustments
    g. Cleaning
    h. Similar operations

3. Review of applicable guarantees and warranties.

4. Demonstration of procedures for routine maintenance, at the equipment involved, to ensure proper accessibility to components involved.

3.16 QUIET OPERATION

A. Equipment and material provided as part of the Work shall NOT produce sound level greater than 55 decibels (or level required by Code, if more stringent) in adjacent occupied areas. Sound level shall be as measured on A-weighting scale of sound level meter or sound survey meter.

B. Methods described in ASHRAE guide and data books may be used to determine sound level of equipment when total of background sound and equipment sound exceeds the required minimum.

C. Contractor shall ensure that equipment and materials provided as part of the Work do NOT produce excessive noise/vibration and do NOT transmit excessive noise/vibration to occupied spaces. If objectionable noise/vibration occurs, Contractor shall provide systems, devices, and equipment necessary to eliminate objectionable noise/vibration at no additional cost to Owner.

D. Refer to VIBRATION AND SEISMIC CONTROLS FOR MECHANICAL SYSTEMS for further requirements.

3.17 FINAL CLEANING

A. Clean each surface of each unit of work, to normal "clean" condition expected for a first-class building cleaning and maintenance program. Comply with manufacturer's instructions for cleaning operations. The following are examples, but not limitations, of cleaning required:

1. Remove labels which are not required as permanent labels.
2. Clean transparent materials, removing substances which are noticeable as vision-obscuring.
3. Clean exposed hard-surfaced finishes, until free of dust, stains, films and similar noticeable substances.
4. Wipe surfaces of mechanical and electrical equipment clean, remove excess lubrication and other substances.
5. Remove debris and surface dust from limited-access spaces such as plenums, shafts, and ceiling spaces.
6. Clean lighting fixtures and lamps; removing dust, smudge marks and protective wraps; so as to function with full efficiency.

3.18 DEMOLITION, RENOVATION, IMPACT TO EXISTING

A. Demolition:

1. In areas where demolition of systems of this Division are indicated, the following requirements apply:

a. Disconnect and remove from the project site, and dispose of in a legal manner, all materials not otherwise identified to be handled otherwise.
b. Investigate impact to areas outside the designated area for demolition and identify any impact that demolition may have on those areas.
c. Building structure, partitions, floors, and walls to remain shall not be impacted by demolition work.

B. Selective Demolition

1. Major changes to existing building spaces and systems have been shown on Contract Drawings; minor changes have NOT been shown. Contractor shall anticipate that there will be numerous minor changes including:

a. Removal and/or relocation of pipes, conduits, wiring, etc
b. Removal and/or relocation of wall and ceiling mounted devices due to architectural revisions or phasing
c. Temporary relocation of existing devices or distribution equipment to permit installation of new work.
d. Temporary work and modifications to existing systems to maintain Owner’s use and operations in areas outside the boundaries of the work.
e. Work related to phased demolition of existing systems
f. Work related to phased installation of new work

2. Remove, store, clean and relocate equipment designated to be relocated and reused.

3. Material which is removed and is not designated for reuse shall, at the Owner's option, either:

a. Be delivered to Owner's storage location
OR
b. Become Contractor's property and be removed from the site and disposed of properly

END OF SECTION 220500

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Pipe positioning systems.
8. Equipment supports.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Pipe stands.
4. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers 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. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

D. Welding certificates.

1.6 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

5. Hanger Rods: Continuous-thread rod, nuts, and washer made of electro-plated galvanized steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.
c. Flex-Strut Inc.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut Corporation; Tyco International, Ltd.
g. Wesanco, Inc.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel.
7. Metallic Coating: Hot-dipped galvanized.

2.4 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Stainless steel.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.6 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Division 07 Section "Roof Accessories" for curbs.

G. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. See Division 22 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

O. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications as required.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports] [metal trapeze pipe hangers] [and] [metal framing systems and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

P. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.
5. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme. For existing buildings undergoing renovations, contact Owner for existing numbering sequences and update existing valve charts for demolition of existing valves and additions of new valves.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link; or S-hook.
3. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
4. Valve-tag schedule shall be included in operation and maintenance data.

2.4 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

2.5 ACCESS IDENTIFICATION

A. Valves and equipment concealed above ceilings shall be identified with ceiling markers, Brady “Valve Finder Ceiling Tacks”, or acceptable equivalent. Ink, crayon or similar identification will not be acceptable. Locate markers on grids where acoustical hung ceilings are installed.

B. Markers:

1. Use colored markers with pressure sensitive adhesive on one side.
2. Make colored markers of paper of plastic, 6 to 9 mm (1/4 to 3/8 inch) in diameter.

C. Use markers of the same diameter throughout building.

D. Color Code: Use following color markers for service identification:

Color	Service
Red	Sprinkler System: Valves and Controls
Green	Domestic Water: Valves and Controls

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Section 099000 "Painting."

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25 feet and at least once in every room. Labels for non-potable water piping shall be spaced at maximum intervals of 10 feet and at least once in every room and adjacent to each wall and floor that it penetrates.

C. Pipe installation when potable water and non-potable, gray water and/or reclaim water systems are installed in the same building:

1. Insulate potable water piping and install labels at intervals not exceeding 10 feet and at least once in each room and near each wall penetration.
2. Paint bare non-potable, gray water and/or reclaim water piping continuously including fittings and valves with purple paint. Install pipe labels on bare non-potable, gray water and/or reclaim water piping at intervals not exceeding 4 feet and at least once in each room, near each wall penetration and near each floor penetration above and below.
3. Wrap all non-potable water, gray water and/or reclaim water piping, fittings and valves with insulation and covers.
4. Paint all non-potable, gray water and/or reclaim insulation covers with purple paint, continuously.

5. Install pipe labels on insulated non-potable, gray water and/or reclaim water piping at intervals not exceeding 10 feet and at least once in each room, near each wall penetration and near each floor penetration above and below.
6. If only small portions of non-potable water systems will be installed in the same building, such as boiler water make-up piping and other piping downstream of backflow preventers, install piping downstream of backflow preventer as described above. Install potable water piping labels at intervals not exceeding 25 feet, at least once in each room and near each wall penetration in all portions of the building.

D. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pretensioned pipe markers. Use size to ensure a tight fit.
2. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.

E. Pipe Label Color Schedule:

1. Domestic Cold Water Piping:

a. Background Color: Green.
b. Letter Color: White.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 1-1/2 inches, round.

2. Valve-Tag Color:

a. Cold Water: Natural.

3. Letter Color:

a. Cold Water: Black.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.

B. Related Sections:

1. None.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
2. Jacket Materials for Pipe: 12 inches long by NPS 2.
3. Sheet Jacket Materials: 12 inches square.

4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

D. Qualification Data: For qualified Installer.

E. 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.

F. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide the following:

a. Pittsburgh Corning Corporation; Foamglas.

2. Block Insulation: ASTM C 552, Type I.
3. Special-Shaped Insulation: ASTM C 552, Type III.
4. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
5. Preformed Pipe Insulation with Factory-Applied ASJ-SSL: Comply with ASTM C 552, Type II, Class 2.
6. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide the following:

    a. CertainTeed Corp.; SoftTouch Duct Wrap.
    b. Johns Manville; Microlite.
    c. Knauf Insulation; Friendly Feel Duct Wrap.
    d. Owens Corning; SOFTR All-Service Duct Wrap.

G. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide the following:

    a. Johns Manville; Micro-Lok.
    b. Knauf Insulation; 1000-Degree Pipe Insulation.
    c. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, provide the following:

    a. Ramco Insulation, Inc.; Super-Stik.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

1. Products: Subject to compliance with requirements, provide the following:

    a. Ramco Insulation, Inc.; Thermokote V.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Products: Subject to compliance with requirements, provide the following:

    a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

1. Products: Subject to compliance with requirements, provide the following:

    a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-84.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
    b. Eagle Bridges - Marathon Industries; 225.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
    d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
    b. Eagle Bridges - Marathon Industries; 225.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.
    d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Corning Corporation; 739, Dow Silicone.
b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
c. P.I.C. Plastics, Inc.; Welding Adhesive.
d. Speedline Corporation; Polyco VP Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.
b. Eagle Bridges - Marathon Industries; 501.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35.
d. Mon-Eco Industries, Inc.; 55-10.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180 deg F.
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
b. Eagle Bridges - Marathon Industries; 570.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
d. Mon-Eco Industries, Inc.; 55-50.
e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.

b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
b. Eagle Bridges - Marathon Industries; 405.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
d. Mon-Eco Industries, Inc.; 44-05.
e. Pittsburgh Corning Corporation; Pittseal 444.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F.
5. Color: White or gray.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Use sealants that 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," including 2004 Addenda.

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
b. Eagle Bridges - Marathon Industries; 405.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.

4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Use sealants that 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," including 2004 Addenda.

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Use sealants that 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," including 2004 Addenda.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Johns Manville; Zeston.
    b. P.I.C. Plastics, Inc.; FG Series.
    c. Proto Corporation; LoSmoke.
    d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. ABI, Ideal Tape Division; 428 AWF ASJ.
    b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
    c. Compac Corporation; 104 and 105.
    d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. ABI, Ideal Tape Division; 491 AWF FSK.
    b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
    c. Compac Corporation; 110 and 111.
    d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.

6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 370 White PVC tape.
b. Compac Corporation; 130.
c. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 488 AWF.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
c. Compac Corporation; 120.
d. Venture Tape; 3520 CW.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.7 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Color: Final color as selected by Engineer. Vary first and second coats to allow visual inspection of the completed Work.

C. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Engineer, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in non-vented crawl spaces except storm piping and grease waste piping.
2. Underground piping except grease waste piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water and Chilled Water:

1. NPS 1 and Smaller: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

2. NPS 1-1/4 and Larger: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

3.11 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed: PVC: 30 mils thick.

D. Piping, Exposed: PVC: 30 mils thick.

END OF SECTION 220719

SECTION 230500 – COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL

1.1 REFERENCES

A. Refer to the Summary of Work, and applicable parts of DIVISION 1 for other general requirements. These requirements may be repeated in this Division for emphasis or for inclusion of more stringent/additional related requirements. Such repetition shall NOT be construed to reduce the requirements of those Divisions NOR to eliminate other requirements under those Divisions.

B. The requirements of this Section apply to ALL work specified in this Division, unless modified to be of higher quality or more stringent in another Section.

1.2 INTENT

A. The CONTRACT DOCUMENTS are inclusive of all Drawings and Specifications, both those specifically covering the work of this Division and those covering other subjects of work.

B. It is the intent of the Contract Documents to require finished work, tested and ready for operation.

C. It is not intended that Contract Documents show every pipe, wire, conduit, fitting and appurtenance; however, such parts as may be necessary to complete the systems in accordance with best trade practice and Code requirements and to Engineer's satisfaction shall be deemed to be included.

D. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. DO NOT SCALE THE DRAWINGS.

1.3 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Before submitting prices or beginning work, thoroughly examine the site and the Contract Documents.

B. No claim for extra compensation will be recognized if difficulties are encountered which would have been revealed by examination of site conditions and Contract Documents prior to executing Contract.

C. Where discrepancies occur within Contract Documents, notify Engineer, in writing, of discrepancy and request clarification. Until notified of Engineer's decision, include item or arrangement of better quality, greater quantity or higher cost in Contract price.

D. For material, device and equipment identified on Contract Drawings by manufacturer and/or model: Coordinate with Specification for ancillary requirements and include with furnished item.

E. Notify Engineer, in writing, of materials and apparatus believed to be omitted, inadequate or unsuitable, or in violation of laws, ordinances, rules or regulations of authorities having jurisdiction. In absence of such written notice, it is mutually agreed that bid price for work under each Section has included the cost of items required for acceptable satisfactory functioning of entire system.

1.4 DEFINITIONS

A. Where more than one material, item, or grade is listed in same paragraph, first one named is preferred choice.

B. The following terms are used in this Division and are defined as follows:

1. "Indicated", "shown", "noted", "scheduled", "specified": These terms are a cross-reference to graphics, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements in Contract Documents. NO limitation of location is intended except as specifically noted.
2. "Directed", "requested", "authorized", "selected", "required", "permitted": Where not otherwise explained, these terms mean "directed by the Engineer", "requested by the Engineer", etc. However, NO such implied meaning will be interpreted to extend the Engineer's responsibility into Contractor's area of construction supervision or means and methods.
3. "Provide": To furnish and install, ready for safe and regular operation the item, material or service indicated.
4. "Furnish": To purchase, acquire and deliver to the site, complete with related accessories.
5. "Install": To erect, mount and connect completely, by acceptable methods.
6. "Work": Labor, materials, equipment, apparatus, controls and accessories required for proper and complete installation.
7. “Finished Spaces”: Spaces other than the following:

    a. Mechanical and electrical equipment rooms.
    b. Furred spaces.
    c. Pipe and duct shafts.
    d. Unheated spaces immediately below roof.
    e. Spaces above ceilings.
    f. Unexcavated spaces.
    g. Crawl spaces.
    h. Tunnels.

8. “Exposed”, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical or electrical equipment rooms.
9. “Exposed”, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

10. “Concealed”, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in shafts.
11. “Concealed”, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated structures.
12. "Acceptable equivalent" or "Equal": Of weight, size, design, capacity and efficiency to meet requirements specified and shown, and of acceptable manufacture, as determined in the opinion of the Engineer.
13. "Acceptable": Acceptable, as determined in the opinion of the Engineer.
14. "Contractor": General Contractor, Trade Contractor, sub-Contractor, or Construction Manager.
15. "Named" Product: Manufacturer's name for product, as recorded in published documents of latest issue as of date of Contract Documents. Obtain Engineer's permission before using products of later or earlier model.

1.5 STANDARDS

A. Standards, specifications and tests of following technical societies, organizations and governmental bodies, as referenced in Contract Documents, are hereby made part of Contract Documents.

1. ANSI: American National Standards Institute
2. ASTM: American Society for Testing and Materials
3. EPA: Environmental Protection Agency
4. FSSC: Federal Specification
5. IRI: Industrial Risk Insurers
6. ISO: Insurance Services Office
7. NBS: National Bureau of Standards
8. NEC: National Electrical Code.
9. NEMA: National Electrical Manufacturers Association
10. NFPA: National Fire Protection Association
11. NSC: National Safety Council
12. OSHA: Occupational Safety and Health Administration
13. UL: Underwriters Laboratories
14. AABC: Associated Air Balance Council
15. ACGIH: American Conference of Governmental Industrial Hygienists
16. ADC: Air Diffusion Council
17. AGA: American Gas Association
18. AMCA: Air Movement and Control Association
19. API: American Petroleum Institute
20. ARI: Air Conditioning and Refrigeration Institute
21. ASCE: American Society of Civil Engineers
22. ASE: Association of Safety Engineers
23. ASHRAE: American Society of Heating, Refrigeration and Air Conditioning Engineers
24. ASME: American Society of Mechanical Engineers
25. ASPE: American Society of Plumbing Engineers
26. AWS: American Welding Society
27. AWWA: American Water Works Association

28. CGA: Compressed Gas Association
29. CSA: Canadian Standards Association
30. CISPI: Cast Iron Soil Pipe Institute
31. EJMA: Expansion Joint Manufacturing Association
32. FM: Factory Mutual Engineering Division
33. HIS: Hydraulic Institute Standards
34. IBR: Institute of Boiler and Radiator Manufacturers
35. MCAA: Mechanical Contractors Association of America
36. NEBB: National Environmental Balancing Bureau
37. NOFI: National Oil Fuel Institute
38. SBI: Steel Boiler Industry (Division of Hydronics Institute)
39. SMACNA: Sheet Metal and Air Conditioning Contractors National Association
40. STI: Steel Tank Institute
41. CODE: Codes and regulations of the Federal, State and local governments and of utility companies having jurisdiction, as appropriate.
42. CODE: Codes and regulations of the Federal, State and local governments and of utility companies having jurisdiction, as appropriate.

B. Use of singular or plural reference form in the Contract Documents shall not be construed to limit number of units required. Specifications are intended to define quality and performance characteristics; quantity of units supplied shall be as needed to meet requirements as specified and at a minimum, as shown on Contract Documents.

1.6 PERMITS, LAWS, ORDINANCES AND CODES

A. Contractor shall obtain and pay for permits, inspections, licenses and certificates required for work under this Division.

B. Complete Utility connections as indicated or needed, extension to Project, metering as required, and connection to building systems, including:

1. Apply for all services and pay for all fees, assessments and charges of the Utility for each connection, all in a timely manner and according to the Project Schedule.
2. Provide and install all metering equipment and accessories as required by Utility. Install entire service in accordance with the Utility's requirements or other applicable regulation.
3. Coordinate with Utility to determine scope of work provided by Utility and the part provided by Contractor so that a complete Utility connection is made.
4. Schedule all work required by utility companies in order to maintain project schedule.

C. Contractor shall pay utility company charges associated with work of this Division.

D. Contractor shall comply with laws, ordinances, rules and regulations of Local, State and Federal authorities having jurisdiction; and shall comply with rules and regulations of National Board of Fire Underwriters, National Electrical Code and local utility companies.

E. Contract Documents shall govern whenever they are more stringent than Code requirements.

1.7 COORDINATION DRAWINGS

A. Before materials are purchased or work is begun, prepare coordination drawings showing relationship of work among all trades.

B. Submit completed and signed coordination drawings to the Engineer for review.

C. Coordination drawings are for use by Contractors and Engineer during construction and are not replacements for shop, as built, or record drawings required elsewhere in the Contract Documents

1.8 SHOP DRAWING SUBMITTALS

A. General

1. Prior to submission of specific shop drawings, submit for review a preliminary list of intended or proposed manufacturers for all items for which shop drawings are required.
2. Submit through contractual channels for review.
3. Number of copies as directed in DIVISION 1, but not less than 6.

B. Shop Drawings

1. Shop drawings shall include the following information:

a. Descriptive and product data necessary to verify compliance with Contract Documents.
b. Manufacturer's specifications including materials of construction, metal gauge, thickness, and finish.
c. Certified dimensional drawings including clearances required for maintenance or access.
d. Performance data, ratings, operating characteristics, and operating limits.
e. Operating points on curves.
f. Electrical ratings and characteristics.
g. Wiring and control diagrams, where applicable.
h. Certifications requested, including UL label or listing.
i. List of accessories which are required but are NOT being furnished by the product manufacturer or are NOT being provided by this Section. Identify the Section(s) by which the accessories are being furnished or provided.

2. Clearly mark submittals with the following:

a. Where equipment is specified, as follows:

1) Specifications: Section and paragraph.
2) Drawings: Drawing number, schedule, note, and detail, as required.

b. Equipment or fixture identification corresponding to that used in Contract Documents.

c. Accessories and special or non-standard features and materials, which are being provided.

3. The selection and intention to use a product specified by name shall NOT excuse the need for timely submission of shop drawings for that product.
4. For samples submitted in lieu of shop drawings, submit as follows:

a. Submit samples in duplicate.
b. Clearly identify the samples.
c. All samples that are not accepted will be returned.
d. For samples that are approved, one sample will be returned and one sample will be kept by the Engineer.

5. Upon completion of shop drawing review, shop drawings will be returned, marked with one of the following notations: Furnish as Submitted, Furnish as Corrected, Revise and Resubmit, Rejected, or Submit Specified Item. Use only products whose shop drawings are marked Furnish as Submitted or Furnish as Corrected.

C. Other Submittals

1. Refer to Sections of this Division for additional submittal requirements relating to specific equipment or systems.

D. Submission of shop drawings of an unnamed manufacture or shop drawings at variance with the Contract Documents is NOT a proper request for substitution.

E. Repeat submission of products without addressing all comments from prior review will be returned to the Contractor without review for correction. Note:

1. Contractor may be liable for additional efforts expended by the Engineer
2. Contractor WILL be liable for impact to project schedule.

F. Test reports are to be submitted to Engineer for review prior to acceptance of equipment or systems for beneficial use.

1.9 PRODUCT SELECTION

A. Options for selecting products are limited by Contract Document requirements and governing regulations and are NOT controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are NOT necessarily limited to, following specifying methods in Contract Documents:

1. Single Product Manufacturer Named: Provide product indicated.
2. Two or More Manufacturers' Products Named: Provide one of the named products, at Contractor's option, but excluding products which do NOT comply with requirements.
3. "Acceptable equivalent" or "Or Equal": Where named products are accompanied by this term or words of similar effect, provide one of named products or propose substitute product according to paragraph 1.10, SUBSTITUTIONS.

4. Standards, Codes and Regulations: Where specification requires only compliance with a standard, code or regulation, Contractor may select any product which complies with requirements of that standard, code or regulation.
5. Performance Requirements: Provide products which comply with specific performances indicated and which are recommended by manufacturer (in published product literature or by individual certification) for application intended. Overall performance of product is implied where product is specified with only certain specific performance requirements.
6. Prescriptive Requirements: Provide products which have been produced in accordance with prescriptive requirements using specified materials and components, and complying with specified requirements for fabricating, finishing, testing and other manufacturing processes.
7. Visual Matching: Where matching with an established material is required, Engineer's judgment of whether proposed product matches established material shall be final.
8. "Color as Selected by Engineer": Unless otherwise noted, where specified product requirements include "color as selected by Engineer" or words of similar effect, the selection of manufacturer and basic product complying with Contract Documents is Contractor's option and subsequent selection of color is Engineer's option.

B. Inclusion by name, of more than one manufacturer or fabricator, does NOT necessarily imply acceptability of standard products of those named. All manufacturers, named or proposed, shall conform, with modification by manufacturer as necessary, to criteria established by Contract Documents for performance, efficiency, materials and special accessories.

1.10 SUBSTITUTIONS

A. Contractor's request for substitution may be submitted only after award of Contract. Requests shall be in writing and presented through appropriate contractual channels.

B. Substitution Request to include the following:

1. Detailed comparison of significant differences in quality, construction, performance, features, options, and appearance between specified item and proposed substitution. Citation, where applicable, to where a specified requirement is located in the Contract Documents is to be provided.
2. Statement of effect on construction time, coordination with other affected work, and cost of work.
3. Contractor's statement to the effect that proposed substitution will result in overall work equal to, or better than, work originally intended.

C. Substitution requests will be considered based on all of the following:

1. If extensive revisions to Contract Documents are NOT required.
2. If changes are in keeping with general intent of Contract Documents.
3. If submitted in timely and proper manner, fully documented.
4. If one or more of following conditions is satisfied; all as judged by Engineer:

a. Where request is directly related to "acceptable equivalent" clause, "or equal" clause or words of similar effect in Contract Documents.

b. Where specified product, material or method CANNOT be provided within Contract Time; but NOT as a result of Contractor's failure to pursue the work promptly or properly coordinate Contractor's efforts.
c. Where substantial advantage is offered Owner; in terms of cost, time, energy conservation or other valuable considerations; after deducting offsetting responsibilities that Owner may be required to bear, including additional compensation to Engineer for redesign and evaluation services, increased cost of other work by Owner or separate contractors, and similar considerations.

D. The burden is upon the Contractor, supplier and manufacturer to satisfy Engineer that:

1. Proposed substitute is equal to, or superior to, the item specified.
2. Intent of the Contract Documents, including required performance, capacity, efficiency, quality, durability, safety, function, appearance, space clearances and delivery date, will be equaled or bettered.

E. Submission of shop drawings of unspecified manufacture or shop drawings at variance with the Contract Documents is NOT a proper request for substitution.

F. Changes in work of other trades, such as structural supports, which are required as a result of substitution and the associated costs for such changes shall be the complete responsibility of Contractor proposing substitution. Except as noted in subparagraph 1.10.C.4 (a) above, there shall be NO additional expense to the Owner.

G. Substitution requests that require the Engineer to expend additional efforts for review, investigation, verification, or similar activities, will require the Contractor to compensate the Engineer at the rate of $120/hour if:

1. Engineer is not familiar with the proposed manufacturer or the proposed product from that manufacturer.
2. Engineer needs to investigate proposed product, attend presentations, confer with other professionals, contact references, or similar activities that would not otherwise have been required if one of the named products was proposed.
3. Engineer must travel to the manufacturer's facilities or a representative installation of the proposed product to review, confirm, or assess product characteristics or directly communicate with manufacturer's representatives on technical or product support subjects.

1.11 SAMPLES

A. Submit samples where required or referenced elsewhere in this Division of work.

B. Where in the opinion of the Engineer, a sample is required to clarify the acceptable characteristics of a material or product, additional samples may be required.

1.12 RECORD DRAWINGS

A. Furnish and keep on the job at all times, a minimum of one complete and separate set of Contract Documents for the purpose of tracking installation of the work.

B. As work progresses, record changes, revisions and additions to the work clearly, neatly, accurately and promptly. Items to be indicated include but are not limited to:

1. Dimensional change of equipment or material
2. Revision to Drawing Detail
3. Location and depth of underground utilities, structures, equipment, tanks, etc - referenced from project benchmarks
4. Location and depth of underslab utilities and distribution
5. Actual routing of distribution systems
6. Revision to power or control wire circuiting/source
7. Actual equipment location
8. Location of concealed distribution work such a pipes, conduits, ducts, etc
9. Location of concealed work and access panels, where access for maintenance or service is required.
10. Changes made by Change Order
11. Details not on original Contract Drawing, but used for installation of the work.
12. Information on concealed elements which would be difficult to identify or measure later.
13. Valve locations and numbers reflecting the final valve tag charts.

C. Indicate daily progress on these prints by coloring in the various lines, fixtures, apparatus and associated appurtenances as they are erected.

D. Approval of requisition for payment for work installed will NOT be given unless supported by record prints as required above.

E. At the conclusion of work, prepare final record drawings reflecting all field recorded data, neatly transferred from documents used in the field to a clean paper set of the Original Contract Documents. Submit record drawings for review by Engineer. After review and acceptance, the Contractor will be furnished with an electronic set of the original contract documents to be edited to reflect modifications and field data as reported on record drawings. Electronic copy of final “as-built” contract documents to be provided to the Owner in a format agreed upon at the commencement of work.

F. Coordination Drawings are to be updated, reflecting installation of work that differs from that presented on the Coordination Drawings which were signed off at the start of work. All trades will review and sign off on these documents as accurate. Electronic copy of final “as-built” coordination drawings to be provided to the Owner in a format agreed upon at the commencement of work.

G. Refer to DIVISION 1 for further requirements.

1.13 OPERATING AND MAINTENANCE MANUALS

A. Submit for review, at least two (or greater quantity if otherwise specified in Division 1), operating and maintenance (O&M) manuals for each system or piece of equipment. Applicable content, as generated, is to be collected continuously during the construction process and maintained in a DRAFT manual format for review by the Engineer at any time.

B. Completed manual will be reviewed by the Engineer and modifications made as identified, before distribution or use. Acceptance will be required prior to scheduling of Owner Training and Instructions.

C. Required modifications identified during Training and Instruction activities are to be made before final Manual is delivered to the Owner.

D. Refer to DIVISION 1 for additional requirements and procedures relating to O&M manuals.

E. Operating and maintenance manual(s) will be organized with the following fundamental content:

1. Table of Contents and Index

2. Project Information

    a. Contractor name, address, contact information, and primary contact individual specific to this project
    b. Sub-contractor names, responsibility, address, contact information, and primary contact individual specific to this project.
    c. Summary description of project scope and period of time work was executed.

3. Guarantees and Warrantees

    a. Documentation describing covered work/materials, effective coverage dates, and terms/conditions
    b. Contact information for initiating a claim and responsible party

4. Each Major Building System

    a. Supplier information including

        1) Technical Support contact
        2) Source of parts / replacement units
        3) Chain of purchase (Supply house, manufacturer's sales vendor, sub-contractor, etc), including Original order number/identification for tracking purposes

b. Operating Instructions

1) Prepared specific for this project

a) System Description
b) Operating parameters
c) Adjustable settings and purpose
d) Warnings and cautions
e) Sequence of Operations and Control Diagrams

2) Description of training and instruction provided to Owner including:

a) Date(s) of instruction/training
b) Agenda
c) Attendee list

c. Maintenance Instructions

1) Prepared specific for this project

a) Preventative maintenance schedule
b) Summary of consumable materials / regularly replaced elements
c) Recommended stocking materials and specialized tools or equipment necessary to perform regular and preventative maintenance
d) Maintenance contracts secured under this project, or separately contracted for through this provider.

d. Commissioning and Test Reports

1) Documentation of all inspection and testing activities performed with associated reports and corrective measures undertaken (if applicable).
2) Factory test reports
3) Certification letters for equipment manufacturers attesting to the complete and satisfactory installation and operation of systems/products.
4) Seismic inspection and certification
5) Special inspections
6) Sign off by Authorities Having Jurisdiction
7) Air and water balance report.

e. Parts / Material List

1) Bill of materials for each system or piece of equipment

f. Product Literature

1) Copy of shop drawings reflecting final acceptance by Engineer, with modifications made reflecting changes to the installed work which is not represented accurately.

g. Manufacturer's Operation & Maintenance Literature

1) Materials provided with equipment/products shipped for use on project
2) Supplementary materials which are required to provide the Owner with a complete representation of manufacturer's instructions and recommendations.

F. In addition to the above, the following Content is to be included in the Operation & Maintenance Manual(s):

1. BMS and temperature control shop drawings.
2. HVAC testing and balancing reports.
3. Commissioning and testing reports.
4. Other data, as required under pertinent Sections of these Specifications.

1.14 GUARANTEE

A. Furnish standard manufacturers' guarantees for work under this Division. Such guarantees shall be in addition to, and NOT in lieu of, other liabilities under the law or by other provisions of the Contract Documents.

B. Materials, equipment and workmanship shall carry the standard warranty against defects in material and workmanship. Failure which may develop due to defective or improper material, equipment, workmanship or design shall be made good, forthwith, by and at the expense of the Contractor, including damage done to areas, materials and other systems resulting from this failure.

C. Guarantee that all elements of the systems are of sufficient capacity to meet the specified performance requirements as set forth in Contract Documents.

D. Upon receipt of notice from Owner of a failure of system(s) or component(s) during the guarantee period, replace affected components within reasonable time period at no additional cost.

E. Guarantee period shall extend for one year from Date of Substantial Completion.

F. Before final request for payment, furnish written guarantee covering above requirements.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

A. Products shall be undamaged and unused at time of installation and shall be complete with accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use.

B. Where available, products shall be standard products of types which have been produced and used previously and successfully on other projects and in similar applications.

C. Labels and Stamps

1. Locate labels and stamps required to be observed after installation on accessible surfaces. In occupied spaces, select locations that are not conspicuous.
2. Locate labels and stamps not required to be observed after installation on concealed surfaces.

D. Provide corrosion resistant fasteners of galvanized or stainless construction where exposed to moist corrosive conditions. Including but not limited to tunnels, manholes, greenhouses and exterior to the building.

PART 3 - EXECUTION

3.1 ARRANGEMENT OF WORK

A. Consult Contract Drawings and Details for exact locations of fixtures and equipment. If exact location is not given, obtain information from Engineer. Verify measurements in field. Base measurements on Engineer's established benchmarks.

B. Install work as closely as possible to layouts shown on Contract Drawings. Modify work as necessary to:

1. Provide maximum possible headroom and space clearance on each side.
2. Provide adequate clearance and ready access to all parts of the work, for inspection, operation, safe maintenance and repair, and code conformance.
3. Coordinate and arrange work to avoid conflicts with work of other trades, to avoid unnecessary cutting and patching, and as needed for satisfactory space conditions shown on coordination drawing submittals.
4. Where space appears inadequate, consult Engineer before proceeding with installation.

C. Coordinate installation of required supporting devices.

D. Set sleeves in cast-in-place concrete for services that will need to pass through concrete. Coring of installed concrete is not intended and the Contractor will be responsible for determining the impact on structural integrity, certifying that there will be no impact, and any remedial work required to accommodate impact from coring.

E. Work shall present a neat coordinated appearance.

3.2 COORDINATION

A. Examine Contract Documents and coordinate with other trades as necessary to facilitate the progress of the work.

B. Each trade shall keep Contractor and other trades fully informed as to shape, size, and locations of openings, chases, equipment, panels, access doors, sleeves, inserts and anchor bolts required; whether temporary or permanent. Coordinate sizes, depths, fill and bedding requirements with excavation trades. Give sufficient advance notice so that coordination may be completed in advance. If information is not furnished in proper and timely fashion, the trade involved shall do own cutting and patching or have same done by Contractor, without additional cost to Owner.

C. Coordinate size and location of concrete bases with DIVISION 3 and the following:

1. Floor Drains and underslab utilities
2. Dimensional requirements for embedded anchors as necessary for support, vibration isolation, and seismic restraint.
3. Access and walkway requirements
4. Work of other trades

D. Particular emphasis is placed on timely installation of major apparatus and furnishing of other trades and Contractor with relevant information.

E. Do NOT install a system until critical components of system and related systems have been coordinated and applicable shop drawings have been accepted.

3.3 WORKMANSHIP

A. Work covered under this Division shall be constructed and finished in every respect in a workmanlike and substantial manner.

B. Equipment and materials shall be new, of first quality, selected and arranged to fit properly into spaces indicated.

C. Obtain detailed information from manufacturer as to proper methods for installation and connections. This includes such tests as equipment manufacturer recommends. Where documentation regarding installation is NOT obtainable, work shall be installed in accordance with best trade practice.

1. Unless specifically indicated otherwise on Contract Documents, equipment and materials shall be installed in accordance with manufacturer's recommendations.
2. Notify Engineer of conflicts between manufacturer's recommendations and Contract Documents requirements, and request clarification before proceeding with installation.

D. Where equipment, piping, ductwork, conduit, etc. is exposed, color of finish or paint shall be as selected by Engineer.

3.4 OPERATION OF SERVICES AND UTILITIES

A. During the construction period and until finally inspected, tested and accepted, maintain new services and utilities.

B. Shutdown of existing services and utilities shall, without exception, be coordinated with the proper utility and with the Owner as to date, time of day, and duration.

1. Notify Engineer and Owner of estimated duration of shutdown period at least ten days in advance of date when shutdown is proposed. Approval of shutdown shall be obtained from proper utility and Owner, before any service is interrupted.
2. Work during shutdown period shall be arranged for continuous performance, including overtime if required, to ensure that existing operating services will be shut down only for time actually necessary to complete connections.

3.5 PROTECTION

A. Contractor shall be responsible for work and equipment until fully inspected, tested and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material or damaging water.

B. Equipment shall be protected against damage while in storage either on or off the construction site. The equipment shall be stored in a dry environment with temperature and controlled to within ranges specified by the manufacturer. Space heaters shall be installed and energized when required to control humidity. Store light sensitive materials where not subjected to direct sunlight.

C. Protect work and material of other trades from damage that might be caused by work of this and other Divisions and correct damage thus caused.

D. Maintain protective measures used for transport of equipment or materials to project site until ready to set and connect utilities and related work. If protective covers need to be removed for inspection or coordination of work, repair or replace to equivalent.

3.6 IDENTIFICATION

A. Distribution systems such as pipes, tubing, conduits, sheetmetal, insulation, etc shall have following information clearly printed on the material: manufacturer's name, material grade, gauge, thickness, type, and data to identify required methods of attachment; as applicable. Unmarked material shall NOT be used.

B. Permanent nameplates shall be provided on each piece of service-connected, power-operated, or distribution equipment, on easily accessible surface. Nameplate shall include product name, model number, serial number, capacity, speed, ratings, and similar essential operating data.

1. Manufacturer's nameplate, name, trademark and address shall be attached permanently to equipment and material furnished. Nameplate showing distributor or Contractor will NOT be permitted.
2. Unless otherwise specified or requested, letters and numbers shall be 1/2" high.
3. Attach nameplates with screws or rivets. Wherever covers of adjacent units are interchangeable, attach nameplates to wall or backboard rather than covers.

C. Unless specified elsewhere in this Section, labels shall be provided to indicate equipment according to designations used in Contract Documents. Label shall be plastic nameplate with letters and numbers 1-1/2" high. Furnish directory indicating number, location and use of each item. After finish painting is completed, apply identification label where it will be readily visible from normal operating position on floor.

3.7 LUBRICATION

A. Equipment shall be furnished and installed so that lubrication points are conveniently and readily accessible for maintenance. Make these provisions by whatever means is appropriate: extended fittings, access doors, equipment location, etc.

B. No equipment shall be operated for temporary service or for testing purposes without proper lubrication. Items requiring lubrication shall be left freshly and fully lubricated at time of substantial completion.

C. Prior to substantial completion, deliver to Owner, along with itemized list: one complete new set of special lubrication devices required for servicing, such as grease guns, fittings and adapters.

3.8 ATTACHMENT OF SUPPORTS TO BUILDING STRUCTURE

A. Equipment shall be securely attached to building structure in acceptable manner. Attachments shall be of strong and durable nature as determined by Engineer.

B. Attachment of supports to roof decking is NOT permitted. Pipes, ducts, conduits, boxes, etc. must be supported from building structural framing (bar joist, beams, columns) or by supplementary members installed by the Contractor, spanning structural framing in a method acceptable to the structural engineer.

C. Cut, Fit and place miscellaneous metal supports for installation of work.

D. Field Welding: Comply with AWS D1.1 or other applicable standards

E. Refer to DIVISION 5 for material specification of supplemental members to be installed.

3.9 ACCESSIBILITY, ACCESS PANELS AND ACCESS DOORS

A. Locate equipment which must be serviced, including motor starters, switches, panels and junction boxes, in accessible locations if at all possible. For other locations, furnish access panels as described under DIVISION 1.

B. Access doors shall be located to conveniently serve intended purpose and shall be installed so that adjacent piping, equipment and structures do NOT render doors unusable.

C. Access doors are not required in removable panel ceilings if suitable identifying markers are provided to indicate access locations.

D. During project closeout, Contractor shall perform walk-through identifying and demonstrating access to equipment for service and/or replacement. Walk-through shall be arranged at times convenient for Engineer and Owner to attend.

1. Equipment with insufficient access shall be relocated or provided with additional access panels at no additional cost to Owner.
2. Trade responsible for access problem shall be responsible for costs of access modifications. In general, this shall be understood to be the trade installing the equipment. If access problem was caused by architectural layout changes which occurred subsequent to equipment installation, cost of access modifications shall be borne by trade responsible for architectural changes.

3.10 WATERPROOFING

A. Where work pierces waterproofing, including waterproof concrete and floor of a wet area, submit method of installation for review by the Engineer before work is done.

B. Provide necessary sleeves, caulking and flashing required to make openings waterproof. See DIVISION 7 on WATERPROOFING.

3.11 GROUTING

A. Mix and install grout for equipment base bearing surfaces, base plates, and anchors

3.12 BASES AND SUPPORTS

A. Unless noted otherwise, provide necessary supports, rails, framing, bases and piers required for equipment furnished or installed under this Division.

B. Unless otherwise indicated: floor-mounted equipment shall be mounted on concrete pads. Concrete and associated reinforcing materials shall be as specified in DIVISION 3, CONCRETE.

1. Pads shall be three-inch thick minimum. Pads for seismically supported equipment shall extend at least 6 inches beyond equipment footprint. Coordinate final extension requirements with approved seismic shop drawing calculations and details. All other pads shall NOT extend more than one inch beyond equipment footprint. Top edge of pads shall be chamfered.
2. Furnish dimensional and load information so that shop drawings for pads may be submitted and reviewed prior to pad installation.
3. Equipment shall be firmly grouted into concrete pads and anchor bolted.

C. Where mounted on the floor: Foundations, supports, pads, bases and piers shall be of the same finish quality as the adjacent flooring material.

D. Equipment supports shall be designed and constructed so that equipment will be capable of resisting both vertical and horizontal movement. Refer to Section “VIBRATION AND SEISMIC CONTROLS” in this Division.

3.13 PAINTING

A. Unless otherwise specified, materials furnished under this Division shall have prime coat and standard manufacturer's finish.

B. Finish painting of exposed work and equipment is covered under DIVISION 9.

C. Paint equipment and appurtenances in concealed and unfinished areas with one coat of rust-inhibiting paint or with an appropriate bitumastic protective product designed for the intended application. Asphalt paint is NOT acceptable. Items to be painted shall include, but not be limited to: non-insulated hangers, supports, piping, conduit, tanks and other ferrous metal work, which are concealed or inaccessible but not galvanized.

D. Special care shall be taken to avoid painting or spattering equipment nameplates.

E. Cooperate in identifying systems for painters. Refer to paragraph, IDENTIFICATION.

3.14 TESTS - GENERAL

A. Make final adjustments to equipment before testing. Manufacturer's authorized representative shall verify proper installation and adjustment prior to startup of major equipment; refer to paragraph, OPERATING AND MAINTENANCE MANUALS.

B. Furnish labor, materials, instruments, supplies and services necessary for testing required under this Division. Correct defects appearing during tests, and repeat tests until no defects are disclosed. Final tests shall be made in Engineer's presence.

C. Use true RMS ammeter to measure current, for equipment which may have harmonic (non-linear) load component.

D. Notify Owner and Engineer of testing schedule at least (48) hours in advance of tests.

E. Perform specified tests and tests required by legal authorities and by agencies having jurisdiction over this Work. Tests shall be performed to the satisfaction of legal authorities, agencies having jurisdiction, and Owner.

F. Each piece of equipment, including motors and controls, shall be operated continuously for minimum test period of one hour.

G. If manufacturer's startup services are specified under other Sections in this Division, furnish services of factory-trained service engineering representative to provide following. If manufacturer's startup services are not required, Contractor shall furnish following services.

1. Inspection of equipment/system installation.
2. Assistance in initial startup and adjustment of equipment; including necessary time to achieve proper installation and adjustments.
3. Instruction of Owner's staff; see paragraph, INSTRUCTIONS.

H. Upon completion of tests, demonstrate the following:

1. Equipment and systems are installed and operating in accordance with manufacturer's specifications and instructions and with Contract Documents.
2. Proper adjustment of equipment and systems.
3. Systems are properly cleaned and free of contaminants.
4. Systems are properly phase balanced.
5. Circuits and motorized equipment are equipped with proper overload protection and are not operating under overload.
6. Instruments are recording properly.

I. Refer to testing requirements in other Sections of this Division for addition work.

3.15 INSTRUCTIONS

A. Arrange for each installer of work requiring continuing maintenance or operation, to meet with Owner's personnel at project site and instruct them in the operation and maintenance. Include instruction by manufacturer's representatives where installers are not expert in the required procedures. Instruction periods for all trades shall be minimum of 8 hours total; refer to individual SECTIONS for further requirements.

B. Instructions include, but are not limited to, the following:

1. Review of Operation and Maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuels, identification system, control sequences, hazards, cleaning, and similar procedures and facilities.
2. Demonstration of the following:

a. Start up procedures
b. Shutdown procedures
c. Emergency operations
d. Noise/vibration control adjustments

e. Safety concerns and protective equipment
f. Economy/efficiency adjustments
g. Cleaning
h. Similar operations

3. Review of applicable guarantees and warranties.
4. Demonstration of procedures for routine maintenance, at the equipment involved, to ensure proper accessibility to components involved.

3.16 QUIET OPERATION

A. Equipment and material provided as part of the Work shall NOT produce sound level greater than 55 decibels (or level required by Code, if more stringent) in adjacent occupied areas. Sound level shall be as measured on A-weighting scale of sound level meter or sound survey meter.

B. Methods described in ASHRAE guide and data books may be used to determine sound level of equipment when total of background sound and equipment sound exceeds the required minimum.

C. Contractor shall ensure that equipment and materials provided as part of the Work do NOT produce excessive noise/vibration and do NOT transmit excessive noise/vibration to occupied spaces. If objectionable noise/vibration occurs, Contractor shall provide systems, devices, and equipment necessary to eliminate objectionable noise/vibration at no additional cost to Owner.

D. Refer to VIBRATION AND SEISMIC CONTROLS FOR MECHANICAL SYSTEMS for further requirements.

3.17 FINAL CLEANING

A. Clean each surface of each unit of work, to normal "clean" condition expected for a first-class building cleaning and maintenance program. Comply with manufacturer's instructions for cleaning operations. The following are examples, but not limitations, of cleaning required:

1. Remove labels which are not required as permanent labels.
2. Clean transparent materials, removing substances which are noticeable as vision-obscuring.
3. Clean exposed hard-surfaced finishes, until free of dust, stains, films and similar noticeable substances.
4. Wipe surfaces of mechanical and electrical equipment clean, remove excess lubrication and other substances.
5. Remove debris and surface dust from limited-access spaces such as plenums, shafts, and ceiling spaces.
6. Clean lighting fixtures and lamps; removing dust, smudge marks and protective wraps; so as to function with full efficiency.

3.18 DEMOLITION, RENOVATION, IMPACT TO EXISTING

A. Demolition:

1. In areas where demolition of systems of this Division are indicated, the following requirements apply:

a. Disconnect and remove from the project site, and dispose of in a legal manner, all materials not otherwise identified to be handled otherwise.
b. Investigate impact to areas outside the designated area for demolition and identify any impact that demolition may have on those areas.
c. Building structure, partitions, floors, and walls to remain shall not be impacted by demolition work.

B. Selective Demolition

1. Major changes to existing building spaces and systems have been shown on Contract Drawings; minor changes have NOT been shown. Contractor shall anticipate that there will be numerous minor changes including:

a. Removal and/or relocation of pipes, conduits, wiring, etc
b. Removal and/or relocation of wall and ceiling mounted devices due to architectural revisions or phasing
c. Temporary relocation of existing devices or distribution equipment to permit installation of new work.
d. Temporary work and modifications to existing systems to maintain Owner’s use and operations in areas outside the boundaries of the work.
e. Work related to phased demolition of existing systems
f. Work related to phased installation of new work

2. Remove, store, clean and relocate equipment designated to be relocated and reused.
3. Material which is removed and is not designated for reuse shall, at the Owner's option, either:

a. Be delivered to Owner's storage location
OR
b. Become Contractor's property and be removed from the site and disposed of properly

END OF SECTION 230500

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40° C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Premium energy efficient. Efficiencies shall comply with local utility company rebate structure.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Rotor: Random-wound, squirrel cage.

F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

G. Temperature Rise: Match insulation rating.

H. Insulation: Class F.

I. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
5. Motors shall have a shaft grounding brush to prevent bearing failure from presence of voltage on the shaft.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1. The Professional Engineer shall be legally qualified to practice in jurisdiction where project is located, and shall be experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for design and installation of hangers and supplies.

B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

C. Refer to Section 230548 “Vibration and Seismic Controls for HVAC Piping and Equipment” for additional requirements.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Signed and sealed by a qualified Professional Engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Pipe stands.
4. Equipment supports.
5. Seismic restraints.

C. Delegated-Design Submittal: For trapeze hangers 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. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

D. Welding certificates.

1.6 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.

4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cooper B-Line, Inc.
b. Flex-Strut Inc.
c. Thomas & Betts Corporation.
d. Unistrut Corporation; Tyco International, Ltd.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Hot-dipped galvanized.
8. Paint Coating: Epoxy.

B. Non-MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anvil International; a subsidiary of Mueller Water Products Inc.
b. Empire Industries, Inc.
c. ERICO International Corporation.
d. Haydon Corporation; H-Strut Division.

e. NIBCO INC.
f. PHD Manufacturing, Inc.
g. PHS Industries, Inc.

2. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Coating: Zinc.

2.4 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:

1. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Division 07 Section "Roof Accessories" for curbs.

G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40 galvanized, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with hot dipped galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
8. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
9. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
10. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.

11. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
12. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
13. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
14. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
15. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
16. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
17. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
18. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
5. C-Clamps (MSS Type 23) with retaining clips: For structural shapes.
6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
7. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
8. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
9. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
10. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
11. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

12. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
13. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
14. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39) for insulated piping without vapor barrier: To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections. Provide spring hangers and supports per Division 23 Section “Vibration and Seismic Controls for HVAC Piping and Equipment.”

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

R. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air systems.
b. Variable-air-volume systems.
c. Multizone systems.

2. Balancing Hydronic Piping Systems:

a. Constant-flow hydronic systems.
b. Variable-flow hydronic systems.
c. Primary-secondary hydronic systems.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

A. LEED Submittal:

1. Air-Balance Report for LEED Prerequisite EQ 1: Documentation of work performed for ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."

B. Qualification Data: Within 15 days of 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.

C. Contract Documents Examination Report: Within 15> days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

D. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

E. Certified TAB reports.

F. Sample report forms.

G. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB or TABB.
2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB or TABB, as a TAB technician.

B. TAB Conference: Meet with Owner and Contractor on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Coordination and cooperation of trades and subcontractors.
d. Coordination of documentation and communication flow.

C. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.

2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard TAB contractor's forms approved by Owner and Contractor Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

A. Subject to compliance with requirements, engage TAB Contractor:

1. As agreed to by Owner.

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

I. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

J. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

L. Examine system pumps to ensure absence of entrained air in the suction piping.

M. Examine operating safety interlocks and controls on HVAC equipment.

N. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Balance, smoke, and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.
7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing", and in this Section.

1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

3.6 PROCEDURES FOR FORCED DRAFT COOLING TOWER

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Consult with equipment manufacturer and literature prior to testing.

2. Measure total airflow.

a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.

3. Measure fan static pressures as follows to determine actual static pressure:

a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
b. Measure static pressure directly at the fan outlet or through the flexible connection.
c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

4. Measure static pressure across each component that makes up the equipment.

a. Report the cleanliness status of filters and the time static pressures are measured.

5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
6. Obtain approval from Owner and Contractor, for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume to indicated airflows within specified tolerances.

1. Re-measure static pressure in duct.
2. Continue to adjust fan speed until indicated airflows within specified tolerances.

3.7 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check liquid level in expansion tank.
3. Check makeup water-station pressure gage for adequate pressure for highest vent.
4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
6. Set system controls so automatic valves are wide open to heat exchangers.
7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.8 PROCEDURES FOR PRIMARY-SECONDARY HYDRONIC SYSTEMS

A. Balance the primary circuit flow first and then balance the secondary circuits.

3.9 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.10 PROCEDURES FOR CHILLERS

A. Balance water flow through each condenser to within specified tolerances of indicated flow with all pumps operating. With only one chiller operating in a multiple chiller installation, do not exceed the flow for the maximum tube velocity recommended by the chiller manufacturer. Measure and record the following data with each chiller operating at design conditions:

1. For water-cooled chillers, condenser-water entering and leaving temperatures, pressure drop, and water flow.

3.11 PROCEDURES FOR COOLING TOWERS

A. Shut off makeup water for the duration of the test, and verify that makeup and blowdown systems are fully operational after tests and before leaving the equipment. Perform the following tests and record the results:

1. Measure condenser-water flow to each cell of the cooling tower.
2. Measure entering- and leaving-water temperatures.
3. Measure wet- and dry-bulb temperatures of entering air.
4. Measure wet- and dry-bulb temperatures of leaving air.
5. Measure condenser-water flow rate recirculating through the cooling tower.
6. Measure cooling-tower spray pump discharge pressure.
7. Adjust water level and feed rate of makeup water system.
8. Measure flow through bypass.

3.12 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the condition of coils.
4. Check bearings and other lubricated parts for proper lubrication.
5. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.13 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.14 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.15 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Engineer's name and address.
6. Contractor's name and address.
7. Report date.
8. Signature of TAB supervisor who certifies the report.
9. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
10. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.

c. Description of system operation sequence if it varies from the Contract Documents.

11. Nomenclature sheets for each item of equipment.
12. Data for terminal units, including manufacturer's name, type, size, and fittings.
13. Notes to explain why certain final data in the body of reports vary from indicated values.
14. Test conditions for fans and pump performance forms including the following:

a. Settings for outdoor-, return-, and exhaust-air dampers.
b. Conditions of filters.
c. Cooling coil, wet- and dry-bulb conditions.
d. Face and bypass damper settings at coils.
e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Inlet vane settings for variable-air-volume systems.
g. Settings for supply-air, static-pressure controller.
h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches, and bore.
i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
j. Number, make, and size of belts.
k. Number, type, and size of filters.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.

d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.
f. Preheat-coil static-pressure differential in inches wg.
g. Cooling-coil static-pressure differential in inches wg.
h. Heating-coil static-pressure differential in inches wg.
i. Outdoor airflow in cfm.
j. Return airflow in cfm.
k. Outdoor-air damper position.
l. Return-air damper position.
m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch o.c.
f. Make and model number.
g. Face area in sq. ft..
h. Tube size in NPS.
i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Average face velocity in fpm.
c. Air pressure drop in inches wg.
d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
e. Return-air, wet- and dry-bulb temperatures in deg F.
f. Entering-air, wet- and dry-bulb temperatures in deg F.
g. Leaving-air, wet- and dry-bulb temperatures in deg F.
h. Water flow rate in gpm.
i. Water pressure differential in feet of head or psig.
j. Entering-water temperature in deg F.
k. Leaving-water temperature in deg F.
l. Refrigerant expansion valve and refrigerant types.

m. Refrigerant suction pressure in psig.
n. Refrigerant suction temperature in deg F.
o. Inlet steam pressure in psig.

G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btu/h.
h. Ignition type.
i. Burner-control types.
j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches, and bore.
n. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm.
b. Entering-air temperature in deg F.
c. Leaving-air temperature in deg F.
d. Air temperature differential in deg F.
e. Entering-air static pressure in inches wg.
f. Leaving-air static pressure in inches wg.
g. Air static-pressure differential in inches wg.
h. Low-fire fuel input in Btu/h.
i. High-fire fuel input in Btu/h.
j. Manifold pressure in psig.
k. High-temperature-limit setting in deg F.
l. Operating set point in Btu/h.
m. Motor voltage at each connection.
n. Motor amperage for each phase.
o. Heating value of fuel in Btu/h.

H. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

    a. System identification.
    b. Location.
    c. Coil identification.
    d. Capacity in Btu/h.
    e. Number of stages.
    f. Connected volts, phase, and hertz.
    g. Rated amperage.
    h. Air flow rate in cfm.
    i. Face area in sq. ft..
    j. Minimum face velocity in fpm.

2. Test Data (Indicated and Actual Values):

    a. Heat output in Btu/h.
    b. Air flow rate in cfm.
    c. Air velocity in fpm.
    d. Entering-air temperature in deg F.
    e. Leaving-air temperature in deg F.
    f. Voltage at each connection.
    g. Amperage for each phase.

I. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

    a. System identification.
    b. Location.
    c. Make and type.
    d. Model number and size.
    e. Manufacturer's serial number.
    f. Arrangement and class.
    g. Sheave make, size in inches, and bore.
    h. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Motor Data:

    a. Motor make, and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches, and bore.
    f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
    g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

   a. Total airflow rate in cfm.
   b. Total system static pressure in inches wg.
   c. Fan rpm.
   d. Discharge static pressure in inches wg.
   e. Suction static pressure in inches wg.

J. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

   a. System and air-handling-unit number.
   b. Location and zone.
   c. Traverse air temperature in deg F.
   d. Duct static pressure in inches wg.
   e. Duct size in inches.
   f. Duct area in sq. ft..
   g. Indicated air flow rate in cfm.
   h. Indicated velocity in fpm.
   i. Actual air flow rate in cfm.
   j. Actual average velocity in fpm.
   k. Barometric pressure in psig.

K. Air-Terminal-Device Reports:

1. Unit Data:

   a. System and air-handling unit identification.
   b. Location and zone.
   c. Apparatus used for test.
   d. Area served.
   e. Make.
   f. Number from system diagram.
   g. Type and model number.
   h. Size.
   i. Effective area in sq. ft..

2. Test Data (Indicated and Actual Values):

   a. Air flow rate in cfm.
   b. Air velocity in fpm.
   c. Preliminary air flow rate as needed in cfm.
   d. Preliminary velocity as needed in fpm.
   e. Final air flow rate in cfm.
   f. Final velocity in fpm.
   g. Space temperature in deg F.

L. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. Water pressure drop in feet of head or psig.
e. Entering-air temperature in deg F.
f. Leaving-air temperature in deg F.

M. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm.
g. Water pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump rpm.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

a. Static head in feet of head or psig.
b. Pump shutoff pressure in feet of head or psig.
c. Actual impeller size in inches.
d. Full-open flow rate in gpm.
e. Full-open pressure in feet of head or psig.
f. Final discharge pressure in feet of head or psig.

g. Final suction pressure in feet of head or psig.
h. Final total pressure in feet of head or psig.
i. Final water flow rate in gpm.
j. Voltage at each connection.
k. Amperage for each phase.

N. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.16 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

a. Measure airflow of at least 10 percent of air outlets.
b. Measure water flow of at least 5 percent of terminals.
c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
d. Verify that balancing devices are marked with final balance position.
e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Engineer and Owner.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Engineer and Owner.
3. Engineer and Owner shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.17 ADDITIONAL TESTS

A. Within (90) days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following HVAC piping systems:

1. Condenser-water piping, indoors.
2. Chilled-water piping, indoors.
3. Heating hot-water piping, indoors.

B. Related Sections:

1. Division 23 Section "HVAC Equipment Insulation."
2. Division 23 Section "Duct Insulation."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at pipe expansion joints for each type of insulation.
3. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
4. Detail removable insulation at piping specialties.
5. Detail application of field-applied jackets.
6. Detail application at linkages of control devices.

C. Qualification Data: For qualified Installer.

D. 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.

E. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," and "Outdoor, Aboveground Piping Insulation Schedule," articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Calcium Silicate:

1. Products: Subject to compliance with requirements, provide the following:

a. Industrial Insulation Group (IIG); Thermo-12 Gold.

2. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
3. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
4. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aerocel.
b. Armacell LLC; AP Armaflex.
c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

H. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Johns Manville; Micro-Lok. HP
b. Knauf Insulation; 1000-Degree Pipe Insulation.
c. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
3. Type II, 1200 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers; CP-97.
b. Eagle Bridges - Marathon Industries; 290.
c. Foster; 81-27.
d. Mon-Eco Industries, Inc.; 22-30.
e. Vimasco Corporation; 760.

C. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aeroseal.
b. Armacell LLC; Armaflex 520 Adhesive.
c. Foster; 85-75.
d. K-Flex USA; R-373 Contact Adhesive.

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers; CP-127.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster; 85-60/85-70.
d. Mon-Eco Industries, Inc.; 22-25.

E. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers; CP-82.
    b. Eagle Bridges - Marathon Industries; 225.
    c. Foster; 85-50.
    d. Mon-Eco Industries, Inc.; 22-25.
    e. Speedline.
    f. Johns Manville.

F. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Dow Corning Corporation; 739, Dow Silicone.
    b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
    c. Speedline Corporation; Polyco VP Adhesive.

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Foster; 30-80/30-90.
    b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers; Encacel.
    b. Eagle Bridges - Marathon Industries; 570.
    c. Foster; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.

4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers; CP-10.
   b. Eagle Bridges - Marathon Industries; 550.
   c. Foster; 46-50.
   d. Mon-Eco Industries, Inc.; 55-50.
   e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.4 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers; CP-50 AHV2.
   b. Foster; 30-36.
   c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.5 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers; CP-76.
   b. Eagle Bridges - Marathon Industries; 405.
   c. Foster; 95-44.
   d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Johns Manville; Zeston.
b. Pag Industries.
c. Proto Corporation; LoSmoke.
d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.8 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 428 AWF ASJ.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
c. Compac Corporation; 104 and 105.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 370 White PVC tape.
b. Compac Corporation; 130.
c. Venture Tape; 1506 CW NS.
d. Johns Manville Zeston Z-Tape.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

2.9 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:

a. ITW Insulation Systems; Gerrard Strapping and Seals.
b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 3/4 inch wide with wing seal or closed seal.
3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.

4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Wire: 0.062-inch soft-annealed, stainless steel.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. C & F Wire.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

E. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.8 FINISHES

A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

    a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Engineer. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Engineer, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Chilled and Condenser Water:

1. NPS 3 and Smaller: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe, Type I: 1-1/2 inches thick.

2. NPS 4 to NPS 12: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.

3. Jackets, All Pipe Sizes:
   a. Horizontal pipes at an elevation of 6 feet or less, to the bottom of the pipe, PVC service jacket
   b. All other pipe, ASJ type jacket

B. Heating-Hot-Water Supply and Return:

1. NPS 12 and Smaller: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.

2. Jackets, All Pipe Sizes:
   a. ASJ type jacket

END OF SECTION 230719

SECTION 230940 – HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes control sequences for HVAC systems, subsystems and equipment.

B. Manufacturers:

1. Acceptable manufacturers of electronic and DDC controls are Snyder Electric, Andover Controls, and Automatic Logic.
2. Other manufacturers will NOT be considered unless specifically requested in writing and specifically approved by the Engineer.

1.3 SCOPE

A. Provide labor, materials, services, equipment and transportation necessary to modify existing systems controls, integrate new equipment into the existing building management system and temporarily modify the operation of existing equipment t, as indicated on Contract Drawings and specified herein, including, but NOT limited to, the following:

1. Modify controls for existing air systems including heating radiation unit heaters to accommodate work
2. Control piping.
3. Checking, servicing, adjusting and putting in proper operating condition: existing controls (such as heating valve control) in systems affected by the Work, so that new and existing components work together to produce the required results.
4. Building Management System integration including:
    a. Control of mechanical systems
    b. Monitoring
    c. Alarm
    d. Integration of new equipment into existing sequence of operations
5. Sleeves, escutcheons, seals, waterproofing and similar devices.
6. Thermometers.
7. Pressure gauges.
8. High efficiency motors for all applications unless noted otherwise.
9. Standard motors for all applications unless noted otherwise.

10. Motor starters.
11. Painting as required under Division 9.
12. Hangers, anchors, guides, bases and other supports.
13. Access panels and access doors.
14. System identification, including valve tags.
15. Noise and vibration control.
16. Seismic restraints, including equipment bolts and welding.
17. Cleaning, lubrication, testing, balancing and adjusting.
18. Coordination drawings.
19. Record drawings.

1.4 SHOP DRAWINGS AND OTHER SUBMITTALS

A. Make preliminary submittal of two sets of Pneumatic and Electric control drawings to Engineer for review before shop drawings are submitted through normal channels. The purpose of this preliminary submittal is to save time. Include the following information:

1. Temperature control ranges
2. Spring pressure ranges
3. Transducer ranges
4. Method of control
5. Control devices selected
6. Description of operation

B. Submit, for review, shop drawings for each item of material, equipment and system component furnished or installed as part of the work of this Section. Shop drawing requirements are specified under SECTION 230010, GENERAL REQUIREMENTS FOR MECHANICAL WORK and under DIVISION 1.

C. Shop drawings shall include control layout and data on sensitivity, pressure ranges, temperature ranges, means of adjustment, means of calibration, spring ranges and other data necessary for review of each device, its function and its intended application.

D. Devices on shop drawings shall be identified by numbers and letters. These identifiers shall also be used in description of operation, in control layouts and on data sheets for ease in cross-referencing.

E. Shop drawings shall include motor efficiency data for three-phase motors 1 HP and larger.

F. Submit circuit coordination information for review by Engineer and Contractor, indicating circuit requirements by electrical panel, i.e., panel identification and maximum load of each circuit required for control system. Submittal will be returned indicating Engineer's final determination of panels and circuits to be used.

1. Furnish copy of final circuit determinations to DIVISION 26 Contractor, for use in preparing panel directories. Information on circuits shall include control component and area served.

G. Furnish certificate from manufacturer of control system that expansion hardware and software shall be available for next 10 years.

H. Update existing instruction manual. Manual shall describe function and operation of all control and management system components and shall include trouble-shooting and operating procedures.

I. Update existing software manual. Software manual shall describe programming and testing.

J. Submit data summary forms to Owner for review. Forms shall define following information, for inclusion into DDC system, for each point in DDC system.

1. Description of each piece of equipment and the functions to be controlled.
2. For each DDC system function, a listing of digital and/or analog hardware required to interface DDC system to equipment.
3. Listing of digital and analog alarms.
4. Listing of DDC system application programs associated with each piece of equipment. This listing shall include control algorithms and mathematical equations and shall be in easy-to-understand English format.

K. Upon completion of project, submit for review control shop drawings corrected for "as-built" conditions. Shop drawings shall include final pressure settings, spring ranges, temperature ranges, throttling ranges and temperature control settings. Three copies of accepted "record" shop drawings shall be furnished to Engineer.

1.5 INSTRUCTION TRAINING

A. Competent technicians shall provide 2 hours of instruction to the Owner's personnel. Instructions shall include, but are NOT limited to, the following:

1. Familiarization with HVAC Control system, hardware and operation procedures.
2. Familiarization with Management System Hardware.
3. Use of management system.
4. Modifications of software packages.
5. Trouble-shooting and service procedures.

PART 2 - PRODUCTS

2.1 CONTROL SYSTEM – GENERAL REQUIREMENTS

A. All equipment shall be by one manufacturer, insofar as possible. Unless specified otherwise, equipment shall be fully modulating and state-of-the-art.

B. Contract Drawings do NOT show every control device and every location. It shall be understood that Specifications are the primary guide to control requirements and that, unless specifically excluded, every piece of heating and cooling equipment shown on Contract Drawings requires controlling device.

C. Control system shall be complete in all respects including:

1. Relays.
2. Control wiring.
3. Auxiliary devices and accessories.
4. Integration with existing building management system, including BACnet interface with air conditioning system manufacturer's controls.

D. Provide power and control wiring, conduit, junction boxes, fittings and other electrical appurtenances that are required for complete and operational control and monitoring systems; conform to electrical standards, codes and requirements specified under DIVISION 26, ELECTRICAL WORK. This work shall include:

1. Wiring of control and monitoring devices and circuits carrying voltages up to and including 120 Volt, unless otherwise indicated.
2. Wiring of 120 VAC power feeds to temperature control panels, CPU, digital controllers, and other control system equipment.
3. Wiring required for interfacing with building management system,
4. Wiring of control system including wiring from sensors to panels, wiring from panels to CPU.
5. Wiring to "Auto" side of hand-off-auto switches on units being controlled as part of work of this Division.
6. Wiring of devices controlled as part of the work of this Division, whether furnished under this Division or another Division. Examples of devices include: alarm device, relay, solenoid valve, actuator and electro-mechanical device at control cabinet.
7. Wiring of devices providing control inputs, whether furnished under this Division or another Division. Examples of devices include: smoke detector contact; fire alarm relay contact; pressure, temperature, limit level and motion switches; PE switch and analog sensor.
8. Wiring from temperature control panel to terminal strips.
9. Wiring between panel terminal strips and field-mounted devices.

E. For bidding purposes, unless otherwise indicated, reuse of existing source electrical panel shall be assumed to have circuit(s) available for control system use. Coordinate selection of circuits for control system use with Owner

F. Power wiring installed and terminated as part of the work of DIVISION 26, ELECTRICAL WORK, shall include:

1. Wiring of devices and circuits carrying voltages GREATER than 120 Volts, unless otherwise indicated.
2. Wiring of power feeds to disconnects, starters and electric motors.
3. Installation of, and wiring of line power to, fused disconnects for each air compressor.

4. Wiring from disconnects to equipment motor starters.
5. Wiring from equipment motor starters to equipment motors.

2.2 THERMOMETERS

A. Unless otherwise specified, local thermometers for central air system shall be provided under Division 23.

2.3 SEQUENCE OF OPERATION: EXISTING EQUIPMENT

A. Construction Phase:

1. Modify existing heating system's sequence of operation as required to maintain conditions in spaces as directed by the Owner.
2. Items include select hot water control valves serving the spaces to avoid simultaneous heating and cooling operation.

2.4 SEQUENCE OF OPERATION: SPLIT A/C SYSTEMS

A. Equipment shall operate via manufacturer's controls from a remote enable/disable and setpoint signal from the campus BMS. Interface shall be through standard BACnet. Coordinate with manufacturer and Owner for requirements.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate with work of DIVISION 26, ELECTRICAL WORK, and work of other Sections of this Division for following:

1. Power to control panels.

3.2 INSTALLATION OF CONTROL WIRING

A. Control troughing and conduit shall be properly supported and anchored; shall be installed in harmony with building lines; and shall NOT interfere with maintenance, service or replacement of other equipment, conduit or piping.

B. Wiring and cables in mechanical equipment spaces or above hung ceilings shall be supported independently from pipes, conduits and ducts of other trades.

C. Wiring, cables and piping shall NOT be dropped over lighting fixtures nor allowed to lay directly on top of ceiling panels or panel support members.

D. Control cable to VFD speed input shall be shielded and shall be installed without excess cable so that electrical noise shall be minimized.

E. Wiring shall be concealed in occupied spaces and protected by conduit where exposed in mechanical rooms, floor-to-floor risers, drops to wall sensor boxes or where subject to damage.

3.3 ADJUSTMENT AND CALIBRATION

A. Calibrate, test and adjust controls and control system including pneumatic and electric controls, thermostats, valves and relays until system is properly adjusted and ready for use. Management system's hardware and software shall be completely checked, test run and modified as required.

B. Be present for functional tests on systems. Before Engineer is asked to witness functional tests, ensure that:

1. Entire control and management system is complete.
2. Controls are calibrated.
3. Controlled devices and equipment have been physically inspected and checked to ensure that these terminal devices are under proper control and working smoothly over their entire range of operation.

C. Adjustment procedure shall include following steps:

1. Preliminary setup and calibration, as specified and as shown on shop drawings.
2. Physical checkout of all components for completeness and accuracy, simultaneously with system adjustment procedure outlined in DIVISION 23, TESTING, ADJUSTING AND BALANCING, together with any required modifications.
3. Review of system with Engineer.
4. Functional tests for Owner's benefit, instruction and acceptance.
5. Review of problems with Owner, rechecking adjustments and calibration as required.

D. Control and Management systems shall NOT be considered complete nor acceptable until:

1. All conditions of Sequence of Operation have been attained.
2. All temperatures are maintained within specified limits under all operating conditions.
3. All system damper leakage is controlled within specified limits.

E. As part of work of this Section, provide calibration and adjustment of airflow control components and be responsible for setting control setpoints, operating sequences, and alarming systems contained within airflow control centers, to produce following overall system performance. Coordinate with DIVISION 23, TESTING, ADJUSTING AND BALANCING.

1. Constant static pressure control within 5% of duct static setpoint without any hunting or cycling.

END OF SECTION 230940

SECTION 232300 – REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 280, Type ACR.

B. Wrought-Copper Fittings: ASME B16.22.

C. Brazing Filler Metals: AWS A5.8.

D. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch-long assembly.
4. Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 deg F.

2.2 VALVES AND SPECIALTIES

A. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Copper spring.
5. Working Pressure Rating: 500 psig.

2.3 REFRIGERANTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Atofina Chemicals, Inc.
2. DuPont Company; Fluorochemicals Div.
3. Honeywell, Inc.; Genetron Refrigerants.
4. INEOS Fluor Americas LLC.

B. ASHRAE 34, R-134a: Tetrafluoroethane.

C. ASHRAE 34, R-407C: Difluoromethane/Pentafluoroethane/1,1,1,2-Tetrafluoroethane.

D. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Suction Lines for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed joints.

B. Liquid Lines: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

C. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with soldered joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

A. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

K. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels if valves or equipment requiring maintenance is concealed behind finished surfaces.

L. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

M. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

N. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

O. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:

1. Shot blast the interior of piping.
2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.

P. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

3.4 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

3.5 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
7. NPS 2-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Follow equipment manufacturers instruction.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

END OF SECTION 232300

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes split-system air-conditioning units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set for each indoor unit.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: Five years from date of Substantial Completion.
b. For Parts: Five years from date of Substantial Completion.
c. For Labor: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
2. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
3. Trane; a business of American Standard companies.

2.2 INDOOR UNITS

A. Wall-Mounted, Evaporator-Fan Components:

1. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
2. Fan: Direct drive, centrifugal.
3. Fan Motors:

    a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
    b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
    c. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
    d. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
    e. Mount unit-mounted disconnect switches on interior of unit.

4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
5. Condensate Drain Pans:

    a. Fabricated with minimum one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

        1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
        2) Depth: A minimum of I inch deep.

    b. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

        1) Minimum Connection Size: NPS 1.

    c. Pan-Top Surface Coating: Asphaltic waterproofing compound.
    d. Condensate drain pan overflow switch for unit shut-down and remote alarm.

6. Air Filtration Section:

   a. General Requirements for Air Filtration Section:

      1) Comply with NFPA 90A.
      2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
      3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

   b. Extended-Surface, Disposable Panel Filters:

      1) Factory-fabricated, dry, extended-surface type.
      2) Thickness: 1 inch.
      3) Arrestance according to ASHRAE 52.1: 90.
      4) Merv according to ASHRAE 52.2: 7.
      5) Media: Fibrous material formed into deep-V-shaped pleats and held by self-supporting wire grid.
      6) Media-Grid Frame: Nonflammable cardboard.
      7) Mounting Frames: Welded, galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.

2.3 OUTDOOR UNITS

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

   a. Compressor Type: Scroll, with variable capacity.
   b. Refrigerant Charge: R-410A or other HFC in the same safety class
   c. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 210/240.

3. Fan: Aluminum-propeller type, directly connected to motor.
4. Motor: Permanently lubricated, with integral thermal-overload protection.
5. Low Ambient Kit: Permits operation down to 0 deg F .

2.4 ACCESSORIES

A. Control wiring is specified in Section 230900 "Instrumentation and Control for HVAC". Provide packaged full function programmable digital controls from equipment manufacturer with LCD screen user interface. Provide BACnet interface controller.

B. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

C. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.
2. 24-hour time control of system stop and start.
3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
4. Fan-speed selection including auto setting.

D. Automatic-reset timer to prevent rapid cycling of compressor.

E. Drain Hose: For condensate.

2.5 CAPACITIES AND CHARACTERISTICS: Shall be as listed on the Drawing Schedules.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted, compressor-condenser components on equipment supports as shown on the drawings Anchor units to supports with removable, cadmium-plated fasteners.

D. Install and connect refrigerant piping to component's fittings. Install piping to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 REFERENCES

A. Refer to the GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS and applicable parts of DIVISION 1 for other general requirements. These requirements may be repeated in this Division for emphasis or for inclusion of more stringent/additional related requirements. Such repetition shall NOT be construed to reduce the requirements of those Divisions NOR to eliminate other requirements under those Divisions.

B. The requirements of this Section apply to ALL work specified in this Division, unless modified to be of higher quality or more stringent in another Section.

1.2 INTENT

A. The CONTRACT DOCUMENTS are inclusive of all Drawings and Specifications, both those specifically covering the work of this Division and those covering other subjects of work.

B. It is the intent of the Contract Documents to require finished work, tested and ready for operation.

C. It is not intended that Contract Documents show every pipe, wire, conduit, fitting and appurtenance; however, such parts as may be necessary to complete the systems in accordance with best trade practice and Code requirements and to Engineer's satisfaction shall be deemed to be included.

D. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. DO NOT SCALE THE DRAWINGS.

1.3 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Before submitting prices or beginning work, thoroughly examine the site and the Contract Documents.

B. No claim for extra compensation will be recognized if difficulties are encountered which would have been revealed by examination of site conditions and Contract Documents prior to executing Contract.

C. Where discrepancies occur within Contract Documents, notify Engineer, in writing, of discrepancy and request clarification. Until notified of Engineer's decision, include item or arrangement of better quality, greater quantity or higher cost in Contract price.

D. For material, device and equipment identified on Contract Drawings by manufacturer and/or model: Coordinate with Specification for ancillary requirements and include with furnished item.

E. Notify Engineer, in writing, of materials and apparatus believed to be omitted, inadequate or unsuitable, or in violation of laws, ordinances, rules or regulations of authorities having jurisdiction. In absence of such written notice, it is mutually agreed that bid price for work under each Section has included the cost of items required for acceptable satisfactory functioning of entire system.

1.4 DEFINITIONS

A. Where more than one material, item, or grade is listed in same paragraph, first one named is preferred choice.

B. The following terms are used in this Division and are defined as follows:

1. "Indicated", "shown", "noted", "scheduled", "specified": These terms are a cross-reference to graphics, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements in Contract Documents. NO limitation of location is intended except as specifically noted.
2. "Directed", "requested", "authorized", "selected", "required", "permitted": Where not otherwise explained, these terms mean "directed by the Engineer", "requested by the Engineer", etc. However, NO such implied meaning will be interpreted to extend the Engineer's responsibility into Contractor's area of construction supervision or means and methods.
3. "Provide": To furnish and install, ready for safe and regular operation the item, material or service indicated.
4. "Furnish": To purchase, acquire and deliver to the site, complete with related accessories.
5. "Install": To erect, mount and connect completely, by acceptable methods.
6. "Work": Labor, materials, equipment, apparatus, controls and accessories required for proper and complete installation.
7. “Finished Spaces”: Spaces other than the following:

    a. Mechanical and electrical equipment rooms.
    b. Furred spaces.
    c. Pipe and duct shafts.
    d. Unheated spaces immediately below roof.
    e. Spaces above ceilings.
    f. Unexcavated spaces.
    g. Crawl spaces.
    h. Tunnels.

8. “Exposed”, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical or electrical equipment rooms.
9. “Exposed”, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

10. “Concealed”, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in shafts.
11. “Concealed”, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated structures.
12. "Acceptable equivalent" or "Equal": Of weight, size, design, capacity and efficiency to meet requirements specified and shown, and of acceptable manufacture, as determined in the opinion of the Engineer.
13. "Acceptable": Acceptable, as determined in the opinion of the Engineer.
14. "Contractor": General Contractor, Trade Contractor, sub-Contractor, or Construction Manager.
15. "Named" Product: Manufacturer's name for product, as recorded in published documents of latest issue as of date of Contract Documents. Obtain Engineer's permission before using products of later or earlier model.

1.5 STANDARDS

A. Standards, specifications and tests of following technical societies, organizations and governmental bodies, as referenced in Contract Documents, are hereby made part of Contract Documents.

1. ANSI: American National Standards Institute
2. ASTM: American Society for Testing and Materials
3. EPA: Environmental Protection Agency
4. FSSC: Federal Specification
5. IRI: Industrial Risk Insurers
6. ISO: Insurance Services Office
7. NBS: National Bureau of Standards
8. NEC: National Electrical Code.
9. NEMA: National Electrical Manufacturers Association
10. NETA: International Electrical Testing Association
11. NFPA: National Fire Protection Association
12. NSC: National Safety Council
13. OSHA: Occupational Safety and Health Administration
14. UL: Underwriters Laboratories
15. NRTL: Nationally Recognized Testing Laboratory (3rd Party)
16. ASHRAE: American Society of Heating Refrigeration and Air Conditioning Engineers
17. ICC: International Code Council
18. IES/IESNA: Illuminating Engineering Society of North America
19. IEEE: The Institute of Electrical & Electronics Engineering
20. BICSI: Building Industry Consulting Services International
21. INETA/NETA: InterNational Electrical Testing Association
22. NECA: National Electrical Contractors Association
23. CODE: Codes and regulations of the Federal, State and local governments and of utility companies having jurisdiction, as appropriate.

B. Use of singular or plural reference form in the Contract Documents shall not be construed to limit number of units required. Specifications are intended to define quality and performance characteristics; quantity of units supplied shall be as needed to meet requirements as specified and at a minimum, as shown on Contract Documents.

1.6 PERMITS, LAWS, ORDINANCES AND CODES

A. Contractor shall obtain and pay for permits, inspections, licenses and certificates required for work under this Division.

B. Complete Utility connections as indicated or needed, extension to Project, metering as required, and connection to building systems, including:

1. Apply for all services and pay for all fees, assessments and charges of the Utility for each connection, all in a timely manner and according to the Project Schedule.
2. Provide and install all metering equipment and accessories as required by Utility. Install entire service in accordance with the Utility's requirements or other applicable regulation.
3. Coordinate with Utility to determine scope of work provided by Utility and the part provided by Contractor so that a complete Utility connection is made.
4. Schedule all work required by utility companies in order to maintain project schedule.

C. Contractor shall pay utility company charges associated with work of this Division.

D. Contractor shall comply with laws, ordinances, rules and regulations of Local, State and Federal authorities having jurisdiction; and shall comply with rules and regulations of National Board of Fire Underwriters, National Electrical Code and local utility companies.

E. Contract Documents shall govern whenever they are more stringent than Code requirements.

1.7 COORDINATION DRAWINGS

A. Before materials are purchased or work is begun, prepare coordination drawings showing relationship of work among all trades.

B. Submit completed and signed coordination drawings to the Engineer for review.

C. Coordination drawings are for use by Contractors and Engineer during construction and are not replacements for shop, as built, or record drawings required elsewhere in the Contract Documents.

1.8 SHOP DRAWING SUBMITTALS

A. General

1. Prior to submission of specific shop drawings, submit for review a preliminary list of intended or proposed manufacturers for all items for which shop drawings are required.
2. Submit through contractual channels for review.
3. Number of copies as directed in DIVISION 1.

B. Shop Drawings

1. Shop drawings shall include the following information:

a. Descriptive and product data necessary to verify compliance with Contract Documents.
b. Manufacturer's specifications including materials of construction, metal gauge, thickness, and finish.
c. Certified dimensional drawings including clearances required for maintenance or access.
d. Performance data, ratings, operating characteristics, and operating limits.
e. Operating points on curves.
f. Electrical ratings and characteristics.
g. Wiring and control diagrams, where applicable.
h. Certifications requested, including UL label or listing.
i. List of accessories which are required but are NOT being furnished by the product manufacturer or are NOT being provided by this Section. Identify the Section(s) by which the accessories are being furnished or provided.

2. Clearly mark submittals with the following:

a. Where equipment is specified, as follows:

1) Specifications: Section and paragraph.
2) Drawings: Drawing number, schedule, note, and detail, as required.

b. Equipment or fixture identification corresponding to that used in Contract Documents.
c. Accessories and special or non-standard features and materials, which are being provided.

3. The selection and intention to use a product specified by name shall NOT excuse the need for timely submission of shop drawings for that product.
4. For samples submitted in lieu of shop drawings, submit as follows:

a. Submit samples in duplicate.
b. Clearly identify the samples.

c. All samples that are not accepted will be returned.
d. For samples that are approved, one sample will be returned and one sample will be kept by the Engineer.

5. Upon completion of shop drawing review, shop drawings will be returned, marked with one of the following notations: Furnish as Submitted, Furnish as Corrected, Revise and Resubmit, Rejected, or Submit Specified Item. Use only products whose shop drawings are marked Furnish as Submitted or Furnish as Corrected.

C. Other Submittals

1. Refer to Sections of this Division for additional submittal requirements relating to specific equipment or systems.

D. Submission of shop drawings of an unnamed manufacture or shop drawings at variance with the Contract Documents is NOT a proper request for substitution.

E. Repeat submission of products without addressing all comments from prior review will be returned to the Contractor without review for correction. Note:

1. Contractor may be liable for additional efforts expended by the Engineer
2. Contractor WILL be liable for impact to project schedule.

F. Test reports are to be submitted to Engineer for review prior to acceptance of equipment or systems for beneficial use.

1.9 PRODUCT SELECTION

A. Options for selecting products are limited by Contract Document requirements and governing regulations and are NOT controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are NOT necessarily limited to, following specifying methods in Contract Documents:

1. Single Product Manufacturer Named: Provide product indicated.
2. Two or More Manufacturers' Products Named: Provide one of the named products, at Contractor's option, but excluding products which do NOT comply with requirements.
3. "Acceptable equivalent" or "Or Equal": Where named products are accompanied by this term or words of similar effect, provide one of named products or propose substitute product according to paragraph SUBSTITUTIONS.
4. Standards, Codes and Regulations: Where specification requires only compliance with a standard, code or regulation, Contractor may select any product which complies with requirements of that standard, code or regulation.
5. Performance Requirements: Provide products which comply with specific performances indicated and which are recommended by manufacturer (in published product literature or by individual certification) for application intended. Overall performance of product is implied where product is specified with only certain specific performance requirements.

6. Prescriptive Requirements: Provide products which have been produced in accordance with prescriptive requirements using specified materials and components, and complying with specified requirements for fabricating, finishing, testing and other manufacturing processes.
7. Visual Matching: Where matching with an established material is required, Engineer's judgment of whether proposed product matches established material shall be final.
8. "Color as Selected by Engineer": Unless otherwise noted, where specified product requirements include "color as selected by Engineer" or words of similar effect, the selection of manufacturer and basic product complying with Contract Documents is Contractor's option and subsequent selection of color is Engineer's option.

B. Inclusion by name, of more than one manufacturer or fabricator, does NOT necessarily imply acceptability of standard products of those named. All manufacturers, named or proposed, shall conform, with modification by manufacturer as necessary, to criteria established by Contract Documents for performance, efficiency, materials and special accessories.

1.10 SUBSTITUTIONS

A. Contractor's request for substitution may be submitted only after award of Contract. Requests shall be in writing and presented through appropriate contractual channels.

B. Substitution Request to include the following:

1. Detailed comparison of significant differences in quality, construction, performance, features, options, and appearance between specified item and proposed substitution. Citation, where applicable, to where a specified requirement is located in the Contract Documents is to be provided.
2. Statement of effect on construction time, coordination with other affected work, and cost of work.
3. Contractor's statement to the effect that proposed substitution will result in overall work equal to, or better than, work originally intended.

C. Substitution requests will be considered based on all of the following:

1. If extensive revisions to Contract Documents are NOT required
2. If changes are in keeping with general intent of Contract Documents
3. If submitted in timely and proper manner, fully documented
4. If one or more of following conditions is satisfied; all as judged by Engineer:

    a. Where request is directly related to "acceptable equivalent" clause, "or equal" clause or words of similar effect in Contract Documents.
    b. Where specified product, material or method CANNOT be provided within Contract Time; but NOT as a result of Contractor's failure to pursue the work promptly or properly coordinate Contractor’s efforts.

c. Where substantial advantage is offered Owner; in terms of cost, time, energy conservation or other valuable considerations; after deducting offsetting responsibilities that Owner may be required to bear, including additional compensation to Engineer for redesign and evaluation services, increased cost of other work by Owner or separate contractors, and similar considerations.

D. The burden is upon the Contractor, supplier and manufacturer to satisfy Engineer that:

1. Proposed substitute is equal to, or superior to, the item specified.
2. Intent of the Contract Documents, including required performance, capacity, efficiency, quality, durability, safety, function, appearance, space clearances and delivery date, will be equaled or bettered.

E. Submission of shop drawings of unspecified manufacture or shop drawings at variance with the Contract Documents is NOT a proper request for substitution.

F. Changes in work of other trades, such as structural supports, which are required as a result of substitution and the associated costs for such changes shall be the complete responsibility of Contractor proposing substitution. Except as noted in subparagraph 1.10.C.4 (a) above, there shall be NO additional expense to the Owner.

G. Substitution requests that require the Engineer to expend additional efforts for review, investigation, verification, or similar activities, will require the Contractor to compensate the Engineer at the rate of $120/hr if:

1. Engineer is not familiar with the proposed manufacturer or the proposed product from that manufacturer
2. Engineer needs to investigate proposed product, attend presentations, confer with other professionals, contact references, or similar activities that would not otherwise have been required if one of the named products was proposed.
3. Engineer must travel to the manufacturer’s facilities or a representative installation of the proposed product to review, confirm, or assess product characteristics or directly communicate with manufacturer’s representatives on technical or product support subjects.

1.11 SAMPLES

A. Submit samples where required or referenced elsewhere in this Division of work.

B. Where in the opinion of the Engineer, a sample is required to clarify the acceptable characteristics of a material or product, additional samples may be required.

1.12 RECORD DRAWINGS

A. Furnish and keep on the job at all times, a minimum of one complete and separate set of Contract Documents for the purpose of tracking installation of the work.

B. As work progresses, record changes, revisions and additions to the work clearly, neatly, accurately and promptly. Items to be indicated include but are not limited to:

1. Dimensional change of equipment or material
2. Revision to Drawing Detail
3. Location and depth of underground utilities, structures, equipment, tanks, etc - referenced from project benchmarks
4. Location and depth of underslab utilities and distribution
5. Actual routing of distribution systems
6. Revision to power or control wire circuiting/source
7. Actual equipment location
8. Location of concealed distribution work such a pipes, conduits, ducts, etc
9. Location of concealed work and access panels, where access for maintenance or service is required.
10. Changes made by Change Order
11. Details not on original Contract Drawing, but used for installation of the work.
12. Information on concealed elements which would be difficult to identify or measure later

C. Indicate daily progress on these prints by coloring in the various lines, fixtures, apparatus and associated appurtenances as they are erected.

D. Approval of requisition for payment for work installed will NOT be given unless supported by record prints as required above.

E. At the conclusion of work, prepare final record drawings reflecting all field recorded data, neatly transferred from documents used in the field to a clean paper set of the Original Contract Documents. Submit record drawings for review by the Engineer. After review and acceptance, the Contractor will be furnished with an electronic set of the original contract documents to be edited to reflect modifications and field data as reported on record drawings. Electronic copy of final “as-built” contract documents to be provided to the Owner in a format agreed upon at the commencement of work.

F. Coordination Drawings are to be updated, reflecting installation of work that differs from that presented on the Coordination Drawings which were signed off at the start of work. All trades will review and sign off on these documents as accurate. Electronic copy of final “as-built” coordination drawings to be provided to the Owner in a format agreed upon at the commencement of work.

G. Refer to DIVISION 1, GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS for further requirements.

1.13 OPERATING AND MAINTENANCE MANUALS

A. Submit for review operating and maintenance (O&M) manuals for each system or piece of equipment. Applicable content, as generated, is to be collected continuously during the construction process and maintained in a DRAFT manual format for review by the Engineer at any time.

B. Completed manual will be reviewed by the Engineer and modifications made as identified, before distribution or use. Acceptance will be required prior to scheduling of Owner Training and Instructions.

C. Required modifications identified during Training and Instruction activities are to be made before final Manual is delivered to the Owner.

D. Refer to DIVISION 1 for additional requirements and procedures relating to O&M manuals.

E. Operating and maintenance manual(s) will be organized with the following fundamental content:

1. Table of Contents and Index

2. Project Information

    a. Contractor name, address, contact information, and primary contact individual specific to this project
    b. Sub-contractor names, responsibility, address, contact information, and primary contact individual specific to this project.
    c. Summary description of project scope and period of time work was executed.

3. Guarantees and Warrantees

    a. Documentation describing covered work/materials, effective coverage dates, and terms/conditions
    b. Contact information for initiating a claim and responsible party

4. Each Major Building System

    a. Supplier information including

        1) Technical Support contact
        2) Source of parts / replacement units
        3) Chain of purchase (Supply house, manufacturer's sales vendor, sub-contractor, etc), including Original order number/identification for tracking purposes

    b. Operating Instructions

        1) Prepared specific for this project

            a) System Description
            b) Operating parameters
            c) Adjustable settings and purpose
            d) Warnings and cautions
            e) Sequence of Operations and Control Diagrams

2) Description of training and instruction provided to Owner including:

a) Date(s) of instruction/training
b) Agenda
c) Attendee list

c. Maintenance Instructions

1) Prepared specific for this project

a) Preventative maintenance schedule
b) Summary of consumable materials / regularly replaced elements
c) Recommended stocking materials and specialized tools or equipment necessary to perform regular and preventative maintenance
d) Maintenance contracts secured under this project, or separately contracted for through this provider.

d. Test Reports

1) Documentation of all inspection and testing activities performed with associated reports and corrective measures undertaken (if applicable).
2) Factory test reports
3) Certification letters for equipment manufacturers attesting to the complete and satisfactory installation and operation of systems/products.
4) Seismic inspection and certification
5) Special inspections
6) Sign off by Authorities Having Jurisdiction

e. Parts / Material List

1) Bill of materials for each system or piece of equipment

f. Product Literature

1) Copy of shop drawings reflecting final acceptance by the Engineer, with modifications made reflecting changes to the installed work which is not represented accurately.

g. Manufacturer's Operation & Maintenance Literature

1) Materials provided with equipment/products shipped for use on project
2) Supplementary materials which are required to provide the Owner with a complete representation of manufacturer's instructions and recommendations.

F. In addition to the above, the following Content is to be included in the Operation & Maintenance Manual(s):

1. Copy of All Panelboard, Power Panel, Distribution Panel, and Switchboard Directory
2. Copy of final Short Circuit Coordination and Arc Flash Study. Copy of all PPE labels, electronic copy and hard copy in color
3. Copy of all electrical testing reports for cables, breakers, distribution system equipment, generation equipment, control and transfer equipment when such is included in project scope.
4. Copy of all testing reports for life safety systems as witness and signed off by Authority Having Jurisdiction.
5. Other data, as required under pertinent Sections of these Specifications.

1.14 GUARANTEE

A. Furnish standard manufacturers' guarantees for work under this Division. Such guarantees shall be in addition to, and NOT in lieu of, other liabilities under the law or by other provisions of the Contract Documents.

B. Materials, equipment and workmanship shall carry the standard warranty against defects in material and workmanship. Failure which may develop due to defective or improper material, equipment, workmanship or design shall be made good, forthwith, by and at the expense of the Contractor, including damage done to areas, materials and other systems resulting from this failure.

C. Guarantee that all elements of the systems are of sufficient capacity to meet the specified performance requirements as set forth in Contract Documents.

D. Upon receipt of notice from Owner of a failure of system(s) or component(s) during the guarantee period, replace affected components within reasonable time period at no additional cost.

E. Guarantee period shall extend for one year from Date of Substantial Completion.

F. Before final request for payment, furnish written guarantee covering above requirements.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

A. Products shall be undamaged and unused at time of installation and shall be complete with accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use.

B. Where available, products shall be standard products of types which have been produced and used previously and successfully on other projects and in similar applications.

C. Labels and Stamps

1. Locate labels and stamps required to be observed after installation on accessible surfaces. In occupied spaces, select locations that are not conspicuous.
2. Locate labels and stamps not required to be observed after installation on concealed surfaces.

PART 3 - EXECUTION

3.1 ARRANGEMENT OF WORK

A. Consult Contract Drawings and Details for exact locations of fixtures and equipment. If exact location is not given, obtain information from Engineer. Verify measurements in field. Base measurements on Engineer's established benchmarks.

B. Install work as closely as possible to layouts shown on Contract Drawings. Modify work as necessary to:

1. Provide maximum possible headroom and space clearance on each side.
2. Provide adequate clearance and ready access to all parts of the work, for inspection, operation, safe maintenance and repair, and code conformance.
3. Coordinate and arrange work to avoid conflicts with work of other trades, to avoid unnecessary cutting and patching, and as needed for satisfactory space conditions shown on coordination drawing submittals.
4. Where space appears inadequate, consult Engineer before proceeding with installation.

C. Coordinate installation of required supporting devices.

D. Set sleeves in cast-in-place concrete for services that will need to pass through concrete. Coring of installed concrete is not intended and the Contractor will be responsible for determining the impact on structural integrity, certifying that there will be no impact, and any remedial work required to accommodate impact from coring.

E. Work shall present a neat coordinated appearance.

3.2 COORDINATION

A. Examine Contract Documents and coordinate with Contractor and other trades as necessary to facilitate the progress of the work.

B. Each trade shall keep Contractor and other trades fully informed as to shape, size, and locations of openings, chases, equipment, panels, access doors, sleeves, inserts and anchor bolts required; whether temporary or permanent. Coordinate sizes, depths, fill and bedding requirements with excavation trades. Give sufficient advance notice so that coordination may be completed in advance. If information is not furnished in proper and timely fashion, the trade involved shall

do own cutting and patching or have same done by Contractor, without additional cost to Owner.

C. Coordinate size and location of concrete bases with DIVISION 3 and the following:

1. Floor Drains and under slab utilities
2. Dimensional requirements for embedded anchors as necessary for support, vibration isolation, and seismic restraint.
3. Access and walkway requirements
4. Work of other trades

D. Particular emphasis is placed on timely installation of major apparatus and furnishing of other trades and Contractor with relevant information.

E. Do NOT install a system until critical components of system and related systems have been coordinated and applicable shop drawings have been accepted.

3.3 WORKMANSHIP

A. Work covered under this Division shall be constructed and finished in every respect in a workmanlike and substantial manner.

B. Equipment and materials shall be new, of first quality, selected and arranged to fit properly into spaces indicated.

C. Obtain detailed information from manufacturer as to proper methods for installation and connections. This includes such tests as equipment manufacturer recommends. Where documentation regarding installation is NOT obtainable, work shall be installed in accordance with best trade practice.

1. Unless specifically indicated otherwise on Contract Documents, equipment and materials shall be installed in accordance with manufacturer's recommendations.
2. Notify Engineer of conflicts between manufacturer's recommendations and Contract Documents requirements, and request clarification before proceeding with installation.

D. Where equipment, piping, ductwork, conduit, etc. is exposed, color of finish or paint shall be as selected by Engineer.

3.4 OPERATION OF SERVICES AND UTILITIES

A. During the construction period and until finally inspected, tested and accepted, maintain new services and utilities.

B. Shutdown of existing services and utilities shall, without exception, be coordinated with the proper utility and with the Owner as to date, time of day, and duration.

1. Notify Engineer and Owner of estimated duration of shutdown period at least ten days in advance of date when shutdown is proposed. Approval of shutdown shall be obtained from proper utility and Owner, before any service is interrupted.
2. Work during shutdown period shall be arranged for continuous performance, including overtime if required, to ensure that existing operating services will be shut down only for time actually necessary to complete connections.

3.5 PROTECTION

A. Contractor shall be responsible for work and equipment until fully inspected, tested and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material or damaging water.

B. Equipment shall be protected against damage while in storage either on or off the construction site. The equipment shall be stored in a dry environment with temperature and controlled to within ranges specified by the manufacturer. Space heaters shall be installed and energized when required to control humidity. Store light sensitive materials where not subjected to direct sunlight.

C. Protect work and material of other trades from damage that might be caused by work of this and other Divisions and correct damage thus caused.

D. Maintain protective measures used for transport of equipment or materials to project site until ready to set and connect utilities and related work. If protective covers need to be removed for inspection or coordination of work, repair or replace to equivalent.

3.6 IDENTIFICATION

A. Distribution systems such as pipes, tubing, conduits, sheet metal, insulation, etc shall have following information clearly printed on the material: manufacturer's name, material grade, gauge, thickness, type, and data to identify required methods of attachment; as applicable. Unmarked material shall NOT be used.

B. Permanent nameplates shall be provided on each piece of service-connected, power-operated, or distribution equipment, on easily accessible surface. Nameplate shall include product name, model number, serial number, capacity, speed, ratings, and similar essential operating data.

1. Manufacturer's nameplate, name, trademark and address shall be attached permanently to equipment and material furnished. Nameplate showing distributor or Contractor will NOT be permitted.
2. Unless otherwise specified or requested, letters and numbers shall be 1/2” high.
3. Attach nameplates with screws or rivets. Wherever covers of adjacent units are interchangeable, attach nameplates to wall or backboard rather than covers.

C. Unless specified elsewhere in this Section, labels shall be provided to indicate equipment according to designations used in Contract Documents. Label shall be plastic nameplate with letters and numbers 1-1/2" high. Furnish directory indicating number, location and use of each item. After finish painting is completed, apply identification label where it will be readily visible from normal operating position on floor.

3.7 LUBRICATION

A. Equipment shall be furnished and installed so that lubrication points are conveniently and readily accessible for maintenance. Make these provisions by whatever means is appropriate: extended fittings, access doors, equipment location, etc.

B. No equipment shall be operated for temporary service or for testing purposes without proper lubrication. Items requiring lubrication shall be left freshly and fully lubricated at time of substantial completion.

C. Prior to substantial completion, deliver to Owner, along with itemized list: one complete new set of special lubrication devices required for servicing, such as grease guns, fittings and adapters.

3.8 ATTACHMENT OF SUPPORTS TO BUILDING STRUCTURE

A. Equipment shall be securely attached to building structure in acceptable manner. Attachments shall be of strong and durable nature as determined by Engineer.

B. Attachment of supports to roof decking is NOT permitted. Pipes, ducts, conduits, boxes, etc. must be supported from building structural framing (bar joist, beams, columns) or by supplementary members installed by the Contractor, spanning structural framing in a method acceptable to the structural engineer.

C. Cut, Fit and place miscellaneous metal supports for installation of work.

D. Field Welding: Comply with AWS D1.1 or other applicable standards

E. Refer to DIVISION 5 for material specification of supplemental members to be installed.

3.9 ACCESSIBILITY, ACCESS PANELS AND ACCESS DOORS

A. Locate equipment which must be serviced, including motor starters, switches, panels and junction boxes, in accessible locations if at all possible. For other locations, furnish access panels as described under DIVISION 1.

B. Access doors shall be located to conveniently serve intended purpose and shall be installed so that adjacent piping, equipment and structures do NOT render doors unusable.

C. Access doors are not required in removable panel ceilings if suitable identifying markers are provided to indicate access locations.

D. During project closeout, Contractor shall perform walk-through identifying and demonstrating access to equipment for service and/or replacement. Walk-through shall be arranged at times convenient for Engineer and Owner to attend.

1. Equipment with insufficient access shall be relocated or provided with additional access panels at no additional cost to Owner.
2. Trade responsible for access problem shall be responsible for costs of access modifications. In general, this shall be understood to be the trade installing the equipment. If access problem was caused by architectural layout changes which occurred subsequent to equipment installation, cost of access modifications shall be borne by trade responsible for architectural changes.

3.10 WATERPROOFING

A. Where work pierces waterproofing, including waterproof concrete and floor of a wet area, submit method of installation for review by the Engineer before work is done.

B. Provide necessary sleeves, caulking and flashing required to make openings waterproof. See DIVISION 7 on WATERPROOFING.

3.11 GROUTING

A. Mix and install grout for equipment base bearing surfaces, base plates, and anchors

3.12 BASES AND SUPPORTS

A. Unless noted otherwise, provide necessary supports, rails, framing, bases and piers required for equipment furnished or installed under this Division.

B. Unless otherwise indicated: floor-mounted equipment shall be mounted on concrete pads. Concrete and associated reinforcing materials shall be as specified in DIVISION 3, CONCRETE.

1. Pads shall be four-inch thick minimum. Pads for seismically supported equipment shall extend at least 6 inches beyond equipment footprint. Coordinate final extension requirements with approved seismic shop drawing calculations and details. All other pads shall NOT extend more than one inch beyond equipment footprint. Top edge of pads shall be chamfered.
2. Furnish dimensional and load information so that shop drawings for pads may be submitted and reviewed prior to pad installation.
3. Equipment shall be firmly grouted into concrete pads and anchor bolted.

C. Where mounted on the floor: Foundations, supports, pads, bases and piers shall be of the same finish quality as the adjacent flooring material.

D. Equipment supports shall be designed and constructed so that equipment will be capable of resisting both vertical and horizontal movement. Refer to Section VIBRATION AND SEISMIC CONTROLS in this Division.

3.13 PAINTING

A. Unless otherwise specified, materials furnished under this Division shall have prime coat and standard manufacturer's finish.

B. Finish painting of exposed work and equipment is covered under DIVISION 9.

C. Paint equipment and appurtenances in concealed and unfinished areas with one coat of rust-inhibiting paint or with an appropriate bitumastic protective product designed for the intended application. Asphalt paint is NOT acceptable. Items to be painted shall include, but not be limited to: non-insulated hangers, supports, piping, conduit, tanks and other ferrous metal work, which are concealed or inaccessible but not galvanized.

D. Special care shall be taken to avoid painting or spattering equipment nameplates.

E. Cooperate in identifying systems for painters. Refer to paragraph, IDENTIFICATION in this Section.

3.14 TESTS - GENERAL

A. Make final adjustments to equipment before testing. Manufacturer's authorized representative shall verify proper installation and adjustment prior to startup of major equipment; refer to paragraph, OPERATING AND MAINTENANCE MANUALS in this Section.

B. Furnish labor, materials, instruments, supplies and services necessary for testing required under this Division. Correct defects that appear during tests, and repeat tests until no defects are disclosed. Final tests shall be made in the Engineer's presence.

C. Use true RMS ammeter to measure current, for equipment which may have harmonic (non-linear) load component.

D. Notify Owner and Engineer of testing schedule at least (48) hours in advance of tests.

E. Perform specified tests and tests required by legal authorities and by agencies having jurisdiction over this Work. Tests shall be performed to the satisfaction of legal authorities, agencies having jurisdiction, and Owner.

F. Each piece of equipment, including motors and controls, shall be operated continuously for minimum test period of one hour.

G. If manufacturer's startup services are specified under other Sections in this Division, furnish services of factory-trained service engineering representative to provide following. If manufacturer's startup services are not required, Contractor shall furnish following services.

1. Inspection of equipment/system installation.
2. Assistance in initial startup and adjustment of equipment; including necessary time to achieve proper installation and adjustments.
3. Instruction of Owner's staff; see paragraph, INSTRUCTIONS in this Section.

H. Upon completion of tests, demonstrate the following:

1. Equipment and systems are installed and operating in accordance with manufacturer's specifications and instructions and with Contract Documents.
2. Proper adjustment of equipment and systems.
3. Systems are properly cleaned and free of contaminants.
4. Systems are properly phase balanced.
5. Circuits and motorized equipment are equipped with proper overload protection and are not operating under overload.
6. Instruments are recording properly.

I. Refer to testing requirements in other Sections of this Division for addition work.

3.15 INSTRUCTIONS

A. Arrange for each installer of work requiring continuing maintenance or operation, to meet with Owner's personnel at project site and instruct them in the operation and maintenance. Include instruction by manufacturer's representatives where installers are not expert in the required procedures. Instruction periods for all trades shall be minimum of 8 hours total; refer to individual SECTIONS for further requirements.

B. Instructions include, but are not limited to, the following:

1. Review of Operation and Maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuels, identification system, control sequences, hazards, cleaning, and similar procedures and facilities.
2. Demonstration of the following:

    a. Start up procedures
    b. Shutdown procedures
    c. Emergency operations
    d. Noise/vibration control adjustments
    e. Safety concerns and protective equipment
    f. Economy/efficiency adjustments
    g. Cleaning
    h. Similar operations

3. Review of applicable guarantees and warranties.

4. Demonstration of procedures for routine maintenance, at the equipment involved, to ensure proper accessibility to components involved.

3.16 QUIET OPERATION

A. Equipment and material provided as part of the Work shall NOT produce sound level greater than 55 decibels (or level required by Code, if more stringent) in adjacent occupied areas. Sound level shall be as measured on A-weighting scale of sound level meter or sound survey meter.

B. Methods described in ASHRAE guide and data books may be used to determine sound level of equipment when total of background sound and equipment sound exceeds the required minimum.

C. Contractor shall ensure that equipment and materials provided as part of the Work do NOT produce excessive noise/vibration and do NOT transmit excessive noise/vibration to occupied spaces. If objectionable noise/vibration occurs, Contractor shall provide systems, devices, and equipment necessary to eliminate objectionable noise/vibration at no additional cost to Owner.

D. Refer to Section VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS in this Division for further requirements.

3.17 FINAL CLEANING

A. Clean each surface of each unit of work, to normal "clean" condition expected for a first-class building cleaning and maintenance program. Comply with manufacturer's instructions for cleaning operations. The following are examples, but not limitations, of cleaning required:

1. Remove labels which are not required as permanent labels.
2. Clean transparent materials, removing substances which are noticeable as vision-obscuring.
3. Clean exposed hard-surfaced finishes, until free of dust, stains, films and similar noticeable substances.
4. Wipe surfaces of mechanical and electrical equipment clean, remove excess lubrication and other substances.
5. Remove debris and surface dust from limited-access spaces such as plenums, shafts, and ceiling spaces.
6. Clean lighting fixtures and lamps; removing dust, smudge marks and protective wraps; so as to function with full efficiency.

3.18 DEMOLITION, RENOVATION, IMPACT TO EXISTING

A. Demolition:

1. In areas where demolition of systems of this Division are indicated, the following requirements apply:

a. Disconnect and remove from the project site, and dispose of in a legal manner, all materials not otherwise identified to be handled otherwise.
b. Investigate impact to areas outside the designated area for demolition and identify any impact that demolition may have on those areas.
c. Building structure, partitions, floors, and walls to remain shall not be impacted by demolition work.

B. Selective Demolition

1. Major changes to existing building spaces and systems have been shown on Contract Drawings; minor changes have NOT been shown. Contractor shall anticipate that there will be numerous minor changes including:

a. Removal and/or relocation of pipes, conduits, wiring, etc.
b. Removal and/or relocation of wall and ceiling mounted devices due to architectural revisions or phasing.
c. Temporary relocation of existing devices or distribution equipment to permit installation of new work.
d. Temporary work and modifications to existing systems to maintain Owner’s use and operations in areas outside the boundaries of the work.
e. Work related to phased demolition of existing systems.
f. Work related to phased installation of new work.

2. Remove, store, clean and relocate equipment designated to be relocated and reused.

3. Material which is removed and is not designated for reuse shall, at the Owner's option, either:

a. Be delivered to Owner's storage location
OR
b. Become Contractor's property and be removed from the site and disposed of properly

END OF SECTION 260500

SECTION 260515 - BASIC MATERIALS & METHODS - ELECTRICAL

PART 1 - GENERAL

1.1 REFERENCES

A. This Section covers the specification of basic materials and methods for electrical work. Refer to Section – COMMON WORK RESULTS FOR ELECTRICAL WORK, GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, applicable sections of DIVISION 1, and all other project instructions for other requirements.

B. Refer to DIVISION 07 specifications – "PENETRATION FIRE STOPPING".

1.2 SCOPE

A. Provide labor, materials, services, equipment and transportation necessary for complete and operational electrical systems as indicated on Contract Drawings and specified herein.

B. Interface with work of Mechanical Trades (Divisions 21, 22, & 23):

1. Division 26 is responsible to supply disconnects, starters and motor controls NOT supplied integral to equipment provided under other divisions, unless otherwise noted.
2. Variable Frequency Drives (VFD) for control of motors which are integral to packaged equipment supplied under other Divisions will be supplied by that Division.
3. Variable Frequency Drives (VFD) will be provided by Division 26, unless otherwise noted.
4. Division 26 is responsible for all power wiring to and from Disconnect Switches, Motor Starters (including VFD's), and Motors, unless otherwise noted.
5. A source of power to feed mechanical control panels for Building Management (BMS, DDC, etc.) systems is to be made available by Division 26. Line voltage wiring from power source (breaker in panel) to control panels is to be provided by Mechanical Trade where wiring/homerun has not been indicated elsewhere on Contract Drawings. Coordinate with Division 23 Section, HVAC INSTRUMENTATION AND CONTROLS.

C. This section includes but is not limited to the following:

1. Conduit, cable and fittings
2. Pull boxes and junction boxes
3. Outlet boxes
4. Poke-through assemblies
5. Backboards and equipment cabinets
6. Conduit hangers and supports
7. Wires and cables
8. Splices

9. Receptacles
10. Wall plates
11. Safety switches and fuses
12. Motor starters
13. Terminal strips
14. Labeling and identification

1.3 SUBMITTALS

A. Submit, for review, list of manufacturers and grade or type of material proposed, including wire, wiring devices, terminating systems, connectors, conduit, wireway and fittings. Submit samples if requested.

B. Submit for review shop drawings for all equipment and materials specified under this Section.

C. Prior to final inspection, submit test reports to Engineer for review.

D. Upon completion of job, furnish reproducible copies of wiring and interconnection diagrams required for clear and permanent record of interconnected equipment, such as alarms and annunciator panels.

1.4 COORDINATION DRAWINGS

A. Refer to Section, PROJECT COORDINATION AND COORDINATION DRAWINGS in this Division.

1.5 STANDARDS

A. All work shall conform to following standards:

1. NEMA Standards.
2. ANSI Standard CI: National Electrical Code (NFPA 70).
3. ANSI Standard C50: Rotating Electrical Machinery.
4. ANSI Standard C501-1: Construction and guide for selection, installation and use of electric motors.
5. ANSI Standard C52.1: Motors and generators (NEMA MG1).
6. ADA: Americans with Disabilities Act
7. Refer to Section COMMON WORK RESULTS for additional requirements

1.6 UNDERWRITERS LABORATORIES LABELS

A. Equipment, materials and components, for which there are listings in UL Product Directories, shall bear UL labels.

PART 2 - PRODUCTS

2.1 CONDUIT AND FITTINGS

A. The generic term “Conduit” when reference is made to method of installation and fittings, includes all types of conduit and EMT.

B. Rigid conduit (RMC) shall be UL listed, hot dipped galvanized steel with full cut hot dipped galvanized NPT threads. RMC shall be chromated on all surfaces for corrosion and abrasion protection. Connectors and couplings shall be galvanized steel threaded type listed for RMC use.

C. Intermediate metal conduit (IMC) shall be UL listed, hot galvanized steel with full cut hot galvanized NPT threads and factory-applied interior coating or lining for ease in pulling wires. Connectors and couplings shall be galvanized steel threaded type listed for IMC use.

D. Electric metallic tubing (EMT) shall be UL listed, hot galvanized steel with factory-applied interior coating or lining for ease in pulling wires. Connectors and couplings shall be galvanized steel, either compression type or heavy-duty set screw-type, listed for EMT use. Indent or crimp-type connectors are NOT allowed.

E. Non-metallic conduit (NMC) shall be rigid PVC, heavy-wall Schedule 40, UL rated, acceptable equivalent to Carlon "Type 40". Where non-metallic conduit is installed below paved areas, conduit shall be rigid PVC, heavy wall Schedule 80, UL rated and of same manufacturer as the Schedule 40 conduit.

F. Flexible metal conduit (FMC) shall be UL listed, single strip, spirally wound, corrosion-resistant, galvanized steel acceptable equivalent to Liquatite "Type BR". Use galvanized steel fittings and clamps listed for FMC use.

G. Liquid tight flexible metal conduit (LFMC) shall be UL listed, with a flexible core of single spiral wound strip of hot dipped galvanized steel and a liquid-tight jacket of flame-retardant, sun/oil/acid-resistant flexible PVC: Acceptable equivalent to Liquatite "Type LA". Connectors and couplings shall be zinc-plated malleable iron or steel, with engagement inspection window, locknut and sealing ring; liquid-, oil-, and rain-tight; suitable for wet locations; listed for LFMC use: acceptable equivalent to O-Z/Gedney "Type 4Q".

1. Grey/Tan Type LA liquid-tight flexible metal conduit (LFMC) shall be used for final connections to vibrating equipment and to partition furniture systems.

H. Minimum Conduit and EMT size: 3/4”

I. Minimum Flexible Metal Conduit Size: 1/2”

J. Special Fittings

1. Where conduit penetrates air handling unit walls or plenums and in hazardous (classified) locations: provide sealing fittings acceptable equivalent to Crouse-Hinds "EYS Series".

2. Where conduit penetrates waterproof foundation, floor or roof: provide through-wall seals acceptable equivalent to O.Z./Gedney “Type CSMI” on each side of existing walls and O.Z./Gedney “Type FSK” on new walls.
3. Where conduit from underground distribution system enters building, provide cable terminators acceptable equivalent to O.Z./Gedney "Type CSB".

4. Where conduit is exposed at building expansion joint: provide expansion fittings acceptable equivalent to O.Z./Gedney "Type EX" or "Type EXE".

K. Where conduit is in concrete at building expansion or seismic joint and where conduit is exposed at seismic joint: provide expansion/deflection fittings acceptable equivalent to O.Z./Gedney "Type DX".

2.2 WIREWAYS AND SURFACE RACEWAYS

A. Wireways shall be steel, UL listed, with hinged or screwed covers by Lee Products, Keystone or acceptable equivalent.

1. Minimum Wireway Size: 4” x 4”

B. Surface raceways shall be UL labeled, steel with standard ivory finish, acceptable equivalent to Wiremold. Sizes and types shall be as shown on Contract Drawings or as required by Engineer.

2.3 PENETRATION OF FIRE RATED CONSTRUCTION

A. Refer to Division 07 for specific requirements for penetrations of fire rated construction.

2.4 PULL BOXES AND JUNCTION BOXES

A. Boxes shall be heavy, stamped steel with covers attached by screws. Provide locknuts for conduit size to which boxes are connected. In finished areas, boxes shall have neatly mitered frame and flush steel cover screwed to the frame.

B. Boxes shall be sized according to NEC.

C. Boxes shall be flush mounted where installed with concealed conduit, and surface mounted elsewhere.

D. Low Voltage Boxes: refer to Section LOW VOLTAGE RACEWAY DISTRIBUTION in this Division.

2.5 OUTLET BOXES

A. Outlet boxes for light fixtures in concrete walls or slabs shall be 4” octagonal mud boxes, not less than 2-1/2” deep; other outlet boxes shall be 4” octagonal boxes not less than 2-1/8” deep. Include fixture studs where required.

B. Switch and receptacle outlet boxes in masonry walls and partitions where wiring is concealed shall be standard 4” square, 1-1/2” deep, galvanized boxes with extension cover for the particular device they will receive.

1. Use plaster extension not less than 1/2” deep for boxes installed in plastered or gypsum board walls or cast in concrete. Actual depth of extension ring shall be coordinated with wall finishes to ensure they are flush, or within 1/4”, of the finished surface as dictated by the NEC.
2. Use 1-1/2” deep square corner tile wall extension for boxes installed in tiles, exposed brick or exposed block masonry walls.

C. Where conduit is exposed: switch outlet boxes, plug outlet boxes and fixture outlet boxes shall be acceptable equivalent to Crouse-Hinds "Type FD", with covers to fit devices use.

D. Low Voltage Device Boxes: refer to Section, LOW VOLTAGE RACEWAY DISTRIBUTION in this Division.

2.6 BACKBOARDS & EQUIPMENT CABINETS

A. Backboards shall be 3/4” Type A-C plywood painted on all sides before installation. Paint shall be one coat primer and two coats latex, intumescent, fire-retardant paint acceptable equivalent to Benjamin-Moore “Insul-X” or Sherwin-Williams “FireTex FX5120”. Backboards shall be used for mounting grouped switches, starters and other equipment where shown on Contract Drawings.

A. Equipment cabinets shall be UL listed, sheet steel cabinet with hinged door with catch and lock; mounted on backboard. Cabinets shall be flush or surface-mounted, sized as required to suit equipment.

B. Refer to Section – LOW VOLTAGE RACEWAY DISTRIBUTION in this Division.

2.7 CONDUIT HANGERS AND SUPPORTS

A. Hangers, clips and accessories supporting conduit shall be UL listed.

B. Individual large conduits shall be supported by means of adjustable, malleable hangers of acceptable design placed on maximum 8’-0” centers. Individual small conduits may be held in place by one hole malleable clips.

C. MC cable shall be supported by hangers of acceptable design placed on maximum 4'-0" centers. MC cable shall be supported within 12" of each fitting.

D. HCFC cable shall be supported by hangers of acceptable design placed on maximum 4'-0" center. HCFC cable shall be supported within 12" of each fitting.

2.8 WIRES AND CABLES

A. Secondary conductors shall be new copper with 600 V code gauge insulation, conforming to NEC requirements, and shall be Type THHN/THWN, rated 75° C wet location/90° C dry location except as follows:

1. Type XHHW rated 75° C wet location/90° C dry location shall be used for conductors #3 AWG and larger.
2. Ground wires shall be as specified under Section, ELECTRICAL GROUNDING in this Division, and in accordance with NEC.
3. Type MI cable shall be used where 2 hour ratings are required or where specifically shown in the documents.
4. Type XHHW-2 with cross-linked polyethylene insulation and mineral filler shall be used for low leakage circuits (isolated power).

B. Feeders and branch circuit conductors located below slabs shall be Type THWN-2/XHHW-2, rated 90° for use in dry or wet locations unless noted otherwise.

C. Feeders and branch circuits located below grade shall be Type THWN-2/XHHW-2, rated 90° C for use in dry or wet locations unless noted otherwise.

D. Feeders and branch circuit conductors located above grade and within buildings shall be Type THHN/XHHW for use in dry or damp locations unless noted otherwise.

E. When wire sizes are not shown on Contract Drawings, sizes shall be in accordance with NEC but no smaller than following:

1. Light and power wiring: #12 AWG.
2. Control wiring: #14 AWG.
3. Wiring and cable for alarm and signal systems: as recommended by equipment manufacturer.

F. Miscellaneous cables and wires shall be new copper with 600 V code gauge insulation, conforming to NEC requirements as follows:

1. Type XF or SFF 150° C shall be used for fixture wiring.
2. Type TFE shall be used for high temperature applications.
3. All Variable Frequency Drives (VFD) and harmonic filters shall have VFD cables as manufactured by Belden or equal for the following:

a. Sizes #12 AWG - #2 AWG, 600 VAC, UL1277, TC-ER, (3) stranded tinned copper conductors plus full size insulated ground, overall Beldfoil plus 85% tinned copper braid shield, full size drain wire, XLPE insulated conductors, black PVC jacket, 1000V UL flexible motor supply cable. Belden #29502 – 29507.
b. Sizes #1AWG - #4/0 AWG – Provide symmetrical design with (3) stranded tinned copper conductors plus (3) symmetrical bare copper grounds, (2) spiral copper tape shields (100% coverage), XLPE insulation, black PVC jacket, 1000V UL flexible motor supply cable. Belden #29528- 29532.
c. Sizes 250kcmil, 350kcmil or 500kcmil, Belden #29533, 29534 or 29535.

G. All multi-purpose feeders and circuits shall include a full size neutral and separate insulated ground conductor.

1. All 277/120 VAC circuits shall include separate full sized neutral and insulated ground conductors. Shared neutrals or ground conductors are not permitted.

H. Provide cable supports per NEC ARTICLE 300.19, acceptable equivalent to O.Z./Gedney "Type R" for large cables and Kellems "Grips" for bundles of smaller wires.

2.9 CABLE ASSEMBLIES

A. Type MC cable shall be UL listed, 600 V, 90° C rated, flexible metal encased multi-conductor assembly; with cable sheath of interlocked galvanized steel strip, copper conductors with Code gauge THHN insulation, and internal green insulated ground: acceptable equivalent to AFC "Type MC Tuff". Connectors and fittings shall be galvanized steel, listed for MC cable use. Cable sheath of interlocked aluminum is NOT acceptable. Use of MCAP (all-purpose) cable with built-in armor ground and internal un-insulated grounding conductor is NOT acceptable. Type MC cable shall NOT be used for homeruns.

2.10 SPLICES

A. Splices for #10 or smaller wires shall be made with UL approved solderless connectors: spring type acceptable equivalent to Minnesota Mining and Manufacturing Company "Scotchlock"; or crimp-type acceptable equivalent to Thomas & Betts "Sta-Kon".

B. Splices, cable taps and terminals for #8 and larger shall be made with UL approved compression connectors: compression taps acceptable equivalent to Thomas & Betts "Colored Keyed" "C" taps applied with special tools according to manufacturer's recommendations; or bolted pressure connectors, bronze or copper construction, by Thomas & Betts, Burndy or acceptable equivalent.

2.11 APPLICATIONS – CONDUIT, CABLES, RACEWAYS

A. RMC: buried in floor slabs, in concrete walls, concealed in exterior masonry walls, wiring in fire pump rooms, hazardous locations, applications above 600 V.

B. IMC: where noted on drawings.

C. EMT: unless otherwise noted:

1. Feeders
2. Power wiring in mechanical rooms
3. Wiring for fire alarm systems
4. Wiring for emergency and exit lighting
5. Wiring for emergency communication, security and alarm systems
6. Branch circuits
7. Control wiring, including work done under Division 23
8. Wiring above non-accessible ceilings

D. LFMC: final connections to motors and equipment-mounted controls from minimum of 18" to maximum of 6 feet lengths.

E. FMC: light fixture whips above accessible ceilings, except not in damp or wet locations and limited to maximum lengths of 6 feet.

F. NMC: sleeves through interior walls, below slab-on-grade, electrical ductbanks, and below grade unless otherwise noted.

1. NMC (PVC) conduits 2" and larger, located below slabs and below grade and not encased in concrete, shall be pressure tested to minimum 100 PSI prior to back-filling.

G. MC Cable: Galvanized steel cable only, aluminum clad will not be accepted.

1. Light fixture whips above accessible ceilings, except not in damp or wet locations and limited to maximum lengths of 6 feet. Leave sufficient slack for future removal or servicing of fixtures in finished ceiling.
2. MC Cable shall not be used in wiring of Life Safety or Critical circuits.

H. MC Cable: Galvanized steel cable only, aluminum clad will not be accepted.

1. Light fixture whips above accessible ceilings, except not in damp or wet locations and limited to maximum lengths of 6 feet. Leave sufficient slack for future removal or servicing of fixtures in finished ceiling.
2. MC cable in interior walls constructed of metal studs and gypsum wall board.
3. Where MC cable is allowed, EMT shall be installed from electrical panels to a collector box and from the collector box to the first device in each circuit or to a separate junction box installed in an accessible ceiling space directly above the first device.
4. Self-grounding type MC cables assemblies shall NOT be used.
5. Provide with a separate dedicated insulated ground wire, AFC Type MC/IG or equal where an isolated, redundant, or dedicated ground is required.
6. Record the location of all junction boxes feeding wall devices on the as-built drawings.
7. MC Cable shall not be used in wiring of Life Safety or Critical circuits.
8. MC-FPLP cable may only be used in wiring of the fire alarm system when specified as allowed elsewhere in this specification.

I. Surface raceways and cable tray: as shown on Contract Drawings.

J. In any case not specifically covered, rigid conduit shall be used unless otherwise approved by Engineer.

K. EMT is NOT permitted as a substitute for rigid conduit; MC is NOT permitted as a substitute for flexible metal conduit.

L. AC (BX) cable shall NOT be used.

2.12 RECEPTACLES - GENERAL

A. Receptacles shall be ivory unless noted otherwise or as directed by Engineer. Receptacles wired to emergency circuits shall be red.

B. Receptacles shall be acceptable equivalent to manufacturer's specification grade listed below and shall include grounding screw terminal. Acceptable manufacturers are Cooper, Hubbell, Leviton and P&S.

1. Receptacles for general use (120 V): 20A, duplex-grounding type with "finder-face", Hubbell #5362.
2. Safety type receptacles: 20A, tamper-resistant, duplex-grounding type with smooth face, Hubbell #CR20TR.
3. Plugload “dual” controllable receptacles (120V): 20A, duplex-grounding type, decorator face with printed ink identification marking, fully controlled, color to be unique color, (grey unless noted otherwise) other than that used for general use receptacles, (blue and red shall not be used), Hubbell #DR20C2* or P&S #26352CD*. Unless otherwise indicated, “dual” controllable type shall be used.
4. Plugload “half” controllable receptacles (120V): 20A, duplex-grounding type, decorator face with printed ink identification marking, half controlled, color shall match general use receptacles (blue and red shall not be used), Hubbell #DR20C1* or P&S #26352CH*.
5. USB charger/Duplex receptacles (120V): 20A, duplex-grounding type, decorator face with (2) USB ports with minimum 3Amp, 5VDC, class 2.0 capacity and green LED indicator to show USB power available, color shall match general use receptacles Hubbell #USB20X2*.
6. USB charger station: decorator face with (4) USB ports with minimum 5Amp, 5VDC, class 2.0 capacity and green LED indicator to show USB power available, color shall match general use receptacles Hubbell #USB20X2*.
7. Receptacles for exterior locations: weatherproof Crouse-Hinds FS box with Hubbell "Rayntite" (raintight while in use) aluminum padlockable enclosure and with duplex receptacles as specified for general use.
8. Isolated ground receptacles: 20A, orange, duplex-grounding type with "finder-face"; Hubbell #IG5362.
9. Surge suppression/isolated ground receptacles: 20A, blue, duplex-grounding type with smooth face; Hubbell #IG5362SA.

10. Special two- and three-pole, 250V receptacles and other receptacles required for special equipment: as required to suit equipment; in general, based on Hubbell "HBL9300 Series" for straight blade configuration with appropriate line caps and Hubbell "HBL2300 Series" with safety-shroud for twist-lock configuration with appropriate line caps.
11. Single twist-locking receptacles: 120V-1Ø, 20A, and 30A ratings; comply with NEMA WD1 and NEMA WD6 in the following configurations: L5-20R and L5-30R, Hubbell "HBL2300 Series" with safety-shroud, and appropriate line caps.
12. Single twist-locking receptacles: 250V-1Ø, 20A, and 30A ratings; comply with NEMA WD1 and NEMA WD6 in the following configurations: L6-20 and L6-30R, Hubbell "HBL2300 Series" with safety-shroud, and appropriate line caps.
13. Single twist-locking receptacles: 125/250V-3Ø, 20A and 30A ratings; comply with NEMA WD1 and NEMA WD6 in the following configurations: L14-20R, Hubbell "HBL2400 Series" with safety-shroud, and appropriate line caps and L14-30R, Hubbell "HBL2700 Series" with safety-shroud, and appropriate line caps.
14. Duplex floor receptacles: as specified for general use, for use in floor boxes and in poke-through fittings.

C. Ground Fault Circuit Interrupter branch breakers for personnel protection shall be 20A single-pole molded case circuit breakers with neutral pigtail; shall sense current unbalance between branch circuit and its neutral and shall trip upon unbalance; shall be Class "A", 5 mA sensitivity; and shall be by same manufacturer as panelboards.

D. Ground fault circuit interrupter (GFI) receptacles, shall be NEMA 5-20R, Class “A”, 5 mA sensitivity; self-testing, tamper resistant, weather-resistant, duplex-grounding type with smooth face, ground fault indicator and power indicating LED; Hubbell #GFRST20 Series, or acceptable equivalent.

E. Arc-fault circuit interrupter (AFCI) receptacles shall be NEMA 5-20R, duplex receptacle, tamper resistant, duplex-grounding type. 20A feed-through protection. Push-to-test and reset push button on face. Equal to Hubbell #AFR20TR or Leviton #AFTR2.

2.13 WALL PLATES

A. Wall plates for switches, receptacles and clock outlets where wiring is concealed shall be satin finish, specification grade, Type 302 stainless steel, with blank plates on unused flush boxes: Cooper "S Series".

1. Plates for devices on emergency circuits shall have "EMERGENCY" hot-stamped in 1/4” letters.

B. Plates on exposed conduit boxes shall be galvanized zinc-coated with rounded edges.

C. Plates for special receptacles, other than 120 V, shall be engraved to indicate the voltage. Cover on three phase switches shall read "3 PHASE".

D. Wherever switches are grouped, they shall be ganged and provided with one-piece gang plates to suit installation.

E. Provide blank plates for unused telephone and data outlet boxes.

2.14 SAFETY SWITCHES AND FUSES

A. Work of this Division shall include:

1. Furnishing and installing an appropriate fusible safety switch for each motor, unless otherwise noted.
2. Installation of safety switches furnished under DIVISION 23, MECHANICAL WORK.
3. Fuses for safety switches.
4. Power wiring to and from safety switches.

B. Disconnect Switches for Motor Starters

1. Provide disconnect switch ahead of each magnetic motor starter. The disconnect switch shall be located in sight of the controller location and not more than 50' apart.
2. Where more than one motor is connected to single branch feeder, provide fused disconnect switch for each motor, even if within sight of feeder branch breaker.
3. Motors requiring disconnecting means remote from the starter shall have a fused switch as close as possible to motor.

C. Safety switches shall have rejection clips for RK fuses and NEMA 1 enclosure, unless otherwise noted. Safety switches shall be NEMA Type HD (heavy-duty), manufacturer's specification grade switches by Square D, General Electric, or Westinghouse, acceptable equivalent to following:

1. Switches for use on 120/208 V system: rated for 240 V.
2. Switches for use on 480 V system: rated for 600 V.
3. Fused disconnect 2-pole and 3-pole: Square D "Type H".
4. Switches that are used in conjunction with variable frequency drives (VFDs) and elevators shall have auxiliary contacts that open before switch blades to interrupt control circuits. Auxiliary contacts shall be 120 VAC; 5 Ampere rated.
5. Switches for use with 6 lead motors: 600 VAC, NEMA 4X enclosure.

    a. Fused: Square “D” Type H

D. Fuses for safety switches shall be non-renewable dual element cartridge type, Class RK5, UL listed. Fuses shall be Bussmann #FRN for 208 V usage, and Bussmann #FRS for 460 V usage; or acceptable equivalent by Shawmut or Littelfuse. Install fuse so that size is readily visible. Special types and classes are indicated on Contract Drawings.

E. Provide one spare set of fuses for each type and size used with switches and other equipment.

2.15 MOTOR STARTERS

A. Unless otherwise noted, provide an appropriate motor starter for each motor. Installation of, and power wiring to and from, the starters furnished under DIVISION 23, MECHANICAL WORK, shall be done as part of the work of this Division. Unless otherwise noted, control wiring shall be provided as specified under Section "HVAC INSTRUMENTATION AND CONTROLS" in Division 23.

B. Motor starters shall meet NEC, NEMA, UL, CSA and ANSI and shall be suitable for required load, duty, voltage, phase, frequency, service and location.

C. Starters shall be by Allen-Bradley, Cutler-Hammer/Westinghouse, Square D, or General Electric, acceptable equivalent to following:

1. Manual motor starters for 115 V or 200 V, single-phase motors less than 1/2 HP: Square D "Class 2510" Type FG-5P or Type FG-6P. Provide with pilot light and handle guard/lock-off to prevent accidental operation and to allow starter to be locked in the ON or OFF position.
2. Manual motor starters for three-phase motors: Square D "Class 2510" Type KG-6X. Provide with pilot light and handle guard/lock-off to prevent accidental operation and to allow starter to be locked in the ON or OFF position.
3. Magnetic across-the-line starters, for single-phase motors 1/2 HP and larger and for three-phase motors: Square D "Class 8536".
4. Combination motor starters, with fused disconnect switch (fuse class RK-5): Square D "Class 8538".
5. Combination motor starters, with thermal-magnetic circuit breaker (with interrupting rating as specified elsewhere): Square D "Class 8539".
6. Magnetic starters for two-speed, single winding, consequent pole motors: Square D "Class 8810".
7. Combination motor starters with fused disconnect switch (fuse class RK-5) or with thermal-magnetic circuit breakers; for two-speed, two winding motors: Square D "Class 8810".
8. Reduced voltage starters, solid-state: Square D "Class 8660".

D. Provide compelling and decelerating relays for two-speed motors driving cooling tower fans and other high inertia loads.

E. For 208V systems, provide 120 V control power by tapping one power phase leg with single-pole fuse in fuse clip and running one #12 AWG neutral to starter.

F. For 208V or 277/480 VAC systems, provide integral 120 VAC fused control power transformer in each starter, unless otherwise noted.

G. Unless otherwise noted, motor starter shall have NEMA 1 enclosure.

H. Magnetic starters shall have the following features:

1. Two extra N.O. and two extra N.C. auxiliary contacts, for each speed.
2. "HAND-OFF-AUTOMATIC" switch mounted in cover.
3. Red "ON" pilot light equipped with neon lamp and mounted in starter cover.
4. Red and yellow "ON" pilot lights for high and low speeds, on two-speed motors.
5. Terminal strip for field wiring connections to control circuits.
6. Cover-mounted reset button.
7. Three thermal overload relays, with appropriate heaters to provide protection on all motor phase legs. Relays shall be bimetallic or melting alloy type.
8. High-Low selector switch which is functional only in "HAND" position on two-speed motors.
9. Reverse phase and phase failure relay, for motors 100 HP and larger.
10. Other features specified in motor starter schedule.

I. For control of HVAC starters, refer to DIVISION 23, MECHANICAL WORK.

2.16 EMERGENCY OFF STATION

A. Station shall be flush wall mounted, RED illuminated momentary contact keyed reset switch to de-energize load, with clear, flip-up cover to prevent accidental activation.

B. Assembly shall include flip-up shield, and be labeled “EMERGENCY POWER OFF” STI #SS2024PO-EN or equal.

C. Assembly shall include text on cover reading “Lift to Activate” and labeled**:** “Emergency Power Off”. STI Inc. #SS2035 PO–EN or equal.

2.17 TERMINAL STRIPS

A. Terminal strips shall be Buchanan or acceptable equivalent, with a numbering strip for identification of individual punchings.

2.18 LABELING AND IDENTIFICATION

A. Refer to Section – IDENTIFICATION FOR ELECTRICAL SYSTEMS in this Division.

PART 3 - EXECUTION

3.1 SUPERVISION

A. Furnish services of experienced electrical Superintendent who shall be constantly in charge of electrical work, together with skilled laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.

B. Particular emphasis is placed on timely installation of major apparatus and furnishing of other trades and Contractor with relevant information.

3.2 MOTOR AND CONTROL CIRCUIT WIRING

A. Provide wiring required for electrical equipment furnished under other Divisions of this Specification. Provide disconnects, starting switches and motor protection ahead of each piece of equipment, unless specified otherwise.

B. Check all protective and control equipment furnished or installed under this Division. Ensure that such equipment is properly sized for motor or other electrical equipment that it serves. Replace any material or equipment damaged due to improperly-sized protective control mechanisms.

C. Electrical controls and starters integral with or specialized for mechanical equipment may be specified with equipment in other DIVISIONS. Disconnects and other controls and starters are specified in this Division.

D. Output power wiring from variable frequency drive (VFD) to motor shall be run in metallic conduit; other wiring shall NOT be run in this conduit. VFD shall have separate equipment conductor back to ground bus of source panel or switchboard and shall NOT depend on metallic conduit for grounding. Power shall NOT be applied to VFD until VFD manufacturer has checked and approved VFD installation.

E. Control cable to VFD speed input shall be shielded and shall be installed without excess cable so that electrical noise shall be minimized.

F. Provide pair of control cable from auxiliary contacts of safety switch between VFD and motor to the VFD to interrupt control circuits. Control cable shall be minimum #14, 300 volt.

3.3 IDENTIFICATION

A. Provide nameplates and general identification as required under SECTION 260500, COMMON WORK RESULTS FOR ELECTRICAL, and under DIVISION 1, and as follows:

1. Nameplates on panelboards, distribution panels and service switches: minimum of 1-1/2" by 2-1/2" size with letters not less than 3/8" high.
2. Nameplates on starters and other switches and devices: minimum of 3/4" by 2-1/2" size with letters not less than 1/4" high.

B. Provide printed, colored, adhesive labels for all electrical equipment, such as but not limited to switchboards, panelboards, motor control centers, disconnect switches, meter socket enclosures, etc. to warn qualified personnel of potential electric arc flash hazards. Label shall be a minimum of 4" x 5", conforming to requirements of the 2015 Edition of NFPA 70E and requirements of OSHA.

C. Wall plates provided for flush-mounted control switches in finished areas shall be engraved, stainless steel with black-filled letters.

D. Conductors size #6 and smaller shall have solid color insulation for identification.

E. Conductors size #4 and larger shall have color identification, six inches minimum length near termination and in splice boxes, junction boxes, panels and manholes. Identification shall be by solid color insulation, tape or paint.

F. Phase rotation shall be indicated by following color code:

Phase	**5 KV and 208Y/120V**	**15 KV and 480Y/277V**
A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Neutral	White	White with purple stripe or natural gray
Ground	Green	Green

G. 480 V wiring shall have orange adhesive tape strips with continuous pre-printed legend "480 Volts" affixed near terminations and in pull boxes and wireways. Preprinted tape shall be by Seton Nameplate, W.H.Brady or acceptable equivalent.

H. Conduits containing emergency feeders* shall be identified by attaching orange adhesive tape with black letters stating "EMERGENCY POWER" at three foot maximum intervals.

I. Provide red lamicoid label on cover of motor starter enclosure, adjacent to H-O-A switch, to read:

WARNING- In hand position, all control interlocks are bypassed USE FOR CAUTIOUS TESTING ONLY

J. Where wall plates are provided for control switches flush mounted in finished areas, plates shall be engraved, stainless steel with black-filled letters.

3.4 INSTALLATION OF CABLES

A. Parallel groups of cables shall be supported from below, either by horizontal angle irons or channel systems such as “Unistrut”, with vertical hanger rods at maximum of three-foot intervals.

B. Supports for cables on concrete walls shall be attached to wall with all metal expansion shields.

C. All insulated conductors run in plenum spaces shall be plenum rated and carry UL listing for flame spread and smoke propagation.

3.5 INSTALLATION OF RECEPTACLES

A. Receptacles shall be installed vertical with the U-ground up above the floor and below ceiling. Coordinate with Electrical and Mechanical Contract Drawings for elevations and mounting heights of receptacles and surface raceway. Verify all final locations of devices with Engineer prior to installation.

B. Use of modular wiring connectors to devices is NOT permitted.

C. If receptacles are located within six feet of edge of sink, or water source; GFCI/GFI receptacles shall be used.

D. Where GFI circuit breakers are used, all receptacles on the circuit shall be labeled GFCI/GFI with the circuit number.

E. Where receptacle is required to have GFCI protection and is not in a readily accessible location GFCI circuit breaker is to be used.

3.6 BRANCH CIRCUIT WIRING

A. Multiple branch circuits within a single enclosure (junction box, pull box, panel board) must have individual neutrals (grounded conductors) identified or tie-wrap to line conductors of same circuit.

3.7 MOTOR CONTROL

A. Mount grouped switches, starters and other equipment on backboards. See Paragraph BACKBOARDS & EQUIPMENT CABINETS in this section. Where wall space is not adjacent to equipment being served, or where additional wall space is required, provide free-standing assembly, constructed of metal uni-strut or similar, for mounting of equipment.

END OF SECTION 260515

SECTION 260525 - LOW VOLTAGE RACEWAY DISTRIBUTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. This section covers the specification of raceway systems to support telephone, video, data wiring and security systems. Refer to Section - COMMON WORK RESULTS FOR ELECTRICAL WORK, GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, applicable Sections of Division 1, and all other project instructions for other requirements.

B. Installation shall be in accordance with applicable Codes and ANSI/TIA/EIA 569 Commercial Building Standards for Telecommunications Pathways and Spaces.

1.2 SCOPE

A. Provide labor, materials, equipment and services equipment and transportation necessary for complete and operational raceway system including but not limited to the following:

1. Raceways
2. Outlet, pull and junction boxes
3. Sleeves
4. Grounding

1.3 SUBMITTALS

A. Submit for review shop drawings for the following:

1. Raceways
2. Boxes

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

A. In general, the telecommunications system raceways, outlets and terminal backboard locations shall be as indicated on the Drawings.

3.2 TELECOMMUNICATIONS AND EMPTY RACEWAYS

A. Empty Raceways and Raceways installed for Telecommunications Systems including telephone, data, security, alarm, CATV, sound, video, low voltage conductors, etc. shall be installed as required by the Electrical Code, as required for raceways specified in this Section and as indicated herein.

B. Provide 1-1/4 inch conduit for all voice, data and video, unless otherwise indicated, from outlets indicated on the Drawings into the nearest partition, extended a minimum of 6 inches above an accessible ceiling or to the backboard if there is no nearby accessible ceiling. Provide 90 degree bend at top of wall.

C. Terminate conduits with insulated throat fittings. Provide grounding bushings for backbone and riser conduits and for conduits entering equipment rooms or wiring closets. Ground conduits, cable trays and raceways to the local Telecommunications ground bus using braided hollow copper conductor equal to Belden #8669 (60A ampacity).

D. Provide pull boxes each time raceway installation exceeds a 100-foot (30M) section or a total of 180 degrees in bends and offsets between pull boxes. Do not install a pull box in lieu of a conduit bend. Align the corresponding conduits on opposite sides of pull box with each other.

E. Minimum conduit size for security, alarm, sound and other low voltage systems shall be 3/4"

F. Pull boxes shall be sized according to the following table:

Maximum Trade Size in Conduit Inches	***Size of Box***			***For each additional Conduit increase Width***
	Width	***Depth***	***Length***	
0.75 in.	4 in.	12 in.	3 in.	2 in.
1.0 in	4 in.	16 in.	3 in.	2 in.
1.25 in.	6 in.	20 in.	3 in.	3 in.
1.5 in.	8 in.	27 in.	4 in.	4 in.
2.0 in.	8 in.	36 in.	4 in.	5 in.
2.5 in.	10 in.	42 in.	5 in.	6 in.
3.0 in.	12 in.	48 in.	5 in.	6 in.
3.5 in.	12 in.	54 in.	6 in.	6 in.
4.0 in.	15 in.	60 in.	8 in.	8 in.

NOTE: Width is measured perpendicular to conduit orientation. Length is measured parallel to conduit orientation.

G. Pull boxes with covers over 20 inches shall have piano hinged covers with pad locking capability. Covers over 20 inches wide shall be split bulkhead type with piano hinges located on the long sides. Provide doors where one door is able to be secured to the pull box while the other is able to swing free.

H. Locate pull box so it is accessible and covers can be opened at least to 90 degrees. Where above ceiling or behind access door center pull box in access door or ceiling tile opening.

I. Pull boxes shall be securely mounted to building structure.

J. Grounding continuity shall be assured throughout raceway and pull box installation equal to electrical power raceway installation.

K. Bends shall be large radius, not exceeding 90 degrees and minimum size radius as follows:

1. 2 inch trade size and less - 6 times conduit diameter.
2. 2-1/2 inch trade size and larger - 10 times conduit diameter.
3. Conduits for fiber optics cabling - 10 times conduit diameter.
4. Surface raceways - 2 inch radius bends.

L. Raceways and outlets shall be separated from sources of EMI and RFI such as transformers, ballasts and power lines. Do not install raceways parallel to power raceways unless four-foot distance is maintained. Cross other raceways at 90 degrees. Maintain minimum 24 inch clearance in all directions from lighting fixtures and power wiring rated over 20 A. Maintain a minimum 6-inch clearance elsewhere from raceways and outlets. Maintain 48-inch clearance from transformers. Clearances are measured all around raceway and outlets including through walls and floors.

M. Provide sleeves for raceways and cable trays penetrating full height walls or floors. Install approved fire stop between sleeve and rated wall or floor. Install approved watertight seal between sleeve and wall or floor for penetrations to the exterior or underground. Sleeves shall extend two inches above the floor and shall be watertight.

N. Provide sleeves for telecommunications cabling and at full height walls in path of cabling from outlet location to termination point in closet minimum size two inch except four 4-inch sleeves into telecommunications closets or rooms, computer class rooms, media center and equipment head end rooms.

O. Align sleeves and conduits on opposite walls of rooms, closets or manholes so there is a straight line between corresponding openings, parallel or perpendicular to structure. Provide 4 inch conduits between telecommunications rooms, closets and backboards. As a minimum provide one conduit for telephone cables, one multiple duct conduit with three 1-1/2 inch inner ducts for data and one spare conduit for future use.

P. Provide a 200 lb test pull line in each raceway. Leave 12 inches of exposed slack at each end. Secure pull line at each end to prevent it from slipping back into raceway.

Q. Non-metallic raceways or boxes are not allowed in interiors of buildings.

R. Provide insulated bushings at all cable or pull string penetrations through steel studs.

S. No cabling to an outlet is to be installed exposed. Provide conduit to outlet where cabling would have to be installed exposed.

T. Provide direct raceway from outlet boxes to an accessible location above the finished corridor ceiling, or in area with non-accessible ceilings directly to the plywood termination backboard in the nearest telecommunications closet/room on the same floor or as indicated on the Drawings.

3.3 OUTLETS

A. Provide blank device outlet cover plates for all outlets without device plates installed at time of Substantial Completion. All outlet cover plates shall be of the same finish material and by the manufacturer furnishing all other device and switch plates installed throughout the buildings. Provide blank plate or outlet plate as coordinated with the Telephone, Video and Data System Installer.

B. Provide 4-11/16 inch square by 2-1/8 inch deep box with single gang plaster ring for each outlet, unless otherwise indicated.

C. Outlet shall be spaced 6 inches minimum from an electrical outlet.

END OF SECTION 260525

SECTION 260526 - ELECTRICAL GROUNDING

PART 1 - GENERAL

1.1 REFERENCES

A. This Section covers the specification of grounding for electrical equipment and systems. Refer to Section – COMMON WORK RESULTS FOR ELECTRICAL WORK, GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, applicable Sections of DIVISION 1, and all other project instructions for other requirements.

1.2 SCOPE

A. Provide labor, materials, services, equipment and transportation necessary for complete and operational grounding systems as indicated on Contract Drawings and specified herein, including but not limited to following:

1. Equipment grounds
2. Ground fault protection

1.3 SHOP DRAWING SUBMITTALS

A. Submit for review shop drawings for the following:
1. Bushings and pressure lugs
2. Pipe clamps
3. Circuit breakers
4. Grounding conductors
5. Receptacles
6. Plug-in tester unit

PART 2 - PRODUCTS

2.1 EQUIPMENT GROUNDS

A. Provide green insulated copper equipment grounding conductor between the ground bus of the source distribution panel or switchboard and each load being served. Conductor shall be sized according to NEC Article 250, Table for “Minimum size of Equipment Grounding Conductors”.

B. Provide separate grounding conductor for each branch circuit.

2.2 GROUND FAULT PROTECTION

A. If excessive ground current flows in feeders to 480 V main switchboard, main breakers and/or circuit breakers with ground fault sensing shall trip to protect switchboard against arcing ground faults.

B. Provide ground fault circuit interrupter protection for receptacles as required and indicated.

C. Bonding and Grounding Jumper Cable

1. Provide products meeting the requirements of the Drawings and Specifications from one of the following manufacturers:

a. Belden (No. 8669) or equivalent.

2. Jumper cable shall be hollow braided, 60 Amp capacity, copper.
3. Provide equal conductor as described in "B" above for aluminum equipment.
4. Jumpers shall have compression or exothermic type terminals on both ends of cables. Terminals shall be compatible with jumper cable material and equipment material in order to not have any degenerative reaction.

2.3 MATERIALS

A. Below-grade and concealed connections shall be Thermweld, Cadweld or acceptable equivalent. Above-grade and exposed connections shall be Burndy or acceptable equivalent.

B. Wire shall be stranded bare copper or insulated copper, as indicated on Contract Drawings.

C. Bushings and Pressure Lugs shall be by T&B, O.Z./Gedney or acceptable equivalent.

D. Pipe Clamps shall be by O.Z./Gedney or acceptable equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Refer to SECTION 260515, BASIC MATERIALS & METHODS - ELECTRICAL.

B. Grounding shall be installed and tested in accordance with NEC (NFPA 70) and to satisfaction of local electrical inspector and Engineer.

C. If outlet is located within six feet of edge of sink or water source; GFCI/GFI receptacles shall be used.

3.2 EQUIPMENT GROUNDS

A. Equipment grounds shall be continuous from ground bus to electrical equipment and devices.

B. Provide equipment grounds for electrical equipment furnished or installed as part of this Contract.

C. Grounded service conductor (neutral) of 480Y/277 V distribution system shall be grounded at only one point: neutral connection to the ground bus. Under no circumstances shall system neutral be grounded at any other point. As part of final inspection procedures, demonstrate purity of system neutral.

D. Regardless of rating or length, circuits run in FMC shall carry grounding conductor for that portion of circuit in FMC; bond conductor at each end.

E. Current return conductors (neutrals), which are grounded at the source, shall NOT be used for equipment grounding. Provide separate conductors for equipment grounding; refer to SECTION 260515, paragraph on IDENTIFICATION, for color requirements.

F. Grounding conductor shall be secured to equipment enclosure at power source (usually to a ground bus) and at apparatus being served by AC supply. Grounding conductors shall be insulated and shall be large enough to carry ground fault current safely.

G. Provide following for panelboards: neutral bus insulated from enclosure; and grounding bus bonded to enclosure. Grounding bus shall have means for termination of grounding conductors to panelboard cabinet.

H. Maintain electrical continuity of raceways by the following means:

1. Threaded fittings with joints made up wrench-tight where threaded rigid conduit is used.
2. Threadless fittings made up tight.
3. Metal bushing inside and locknut outside of metal boxes and cabinets when threaded conduit is used. If outside locknut is inaccessible for tightening after installation, provide additional locknut inside. If bushing is composed entirely of insulating material, use locknuts inside and outside.
4. Bonding jumper across joints of wireways, cable trays, expansion or deflection fittings, etc.
5. Devices listed for the purpose by UL.

I. NOTE: Addition of equipment grounding conductor to AC circuits run in metallic enclosures does NOT lessen the requirement for conductor enclosure continuity, since part of total ground fault current will flow through the raceway and enclosure system. Therefore, the continuity of this system shall be maintained.

1. Bond neutrals of each 208Y/120 V distribution transformer to ground so as to be separately derived system and shall be grounded locally to building steel. If building steel does not exist (i.e., concrete structures), the transformer shall be grounded to main service ground bus. Transformer ground shall also be bonded to nearest available local metal water pipe. The primary feeder ground is supplemental and shall be sized for primary feeder protection. Refer to contract drawings for additional bonding requirements.

3.3 IDENTIFICATION

A. Engrave nameplates of receptacles wired to GFI breakers to read "GFI" adjacent to or above receptacle opening.

3.4 TESTS

A. Acceptance testing for electrical grounding systems, specified herein, shall be performed by independent testing firm with minimum ten years experience in testing the specified items. Firm shall be member of International Electrical Testing Association (INETA).

B. Testing procedures shall be as described in INETA "Acceptance Testing Specifications" (ATS).

C. Testing firm shall immediately notify Contractor and Engineer, of any deficiencies requiring correction before electrical system is placed in service and shall confirm information in writing within five days.

D. Discrepancies found shall be corrected by firm which installed switchboard. However, testing firm shall make minor field adjustments that may be found necessary.

E. Test report shall include typewritten test results on firm's standard test forms.

F. Test and inspect the main grounding electrode system in accordance with Section 7.13 of the NETA Acceptance Testing Specification. Perform a resistance to ground test and ensure that resistance is no greater than 5 (five) ohms. Investigate and supplement grounding system where resistance exceeds recommended values and re-test as required.

G. Ground Fault Circuit Interruption shall be tested after installation by random connection of plug-in tester to various protected receptacles, as directed by Engineer.

H. All ground fault systems including but not limited to the main service over-current protective device ground fault protection equipment shall be performance tested when first installed on site per manufacturer’s instructions and Section 7.14 of the NETA Acceptance Testing Specifications Inspection and Test Procedures for Ground-Fault Protection Systems. Tests shall include, but not be limited to, resistance measurements through all bolted connections, insulation resistance test on all control wiring and pick up tests using primary injection.

END OF SECTION 260526

SECTION 262400 - SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 REFERENCES

A. This Section covers the specification of secondary electrical service and distribution systems. Refer to Section – COMMON WORK RESULTS FOR ELECTRICAL WORK, GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, applicable Sections of DIVISION 1, and all other project instructions for other requirements.

1.2 SCOPE

A. Provide labor, materials, services, equipment and transportation necessary for complete and operational secondary electrical service and distribution systems as indicated on Contract Drawings and specified herein, including but not limited to following:

1. Power panelboards
2. Fuses and circuit breakers

B. For related work, refer to Section, VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS.

1.3 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Source Limitations: Obtain each type of switchgear and associated components through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of switchgear and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 SUBMITTALS

A. Specifications Compliance: A complete copy of this switchgear specification with each subparagraph noted with the comment, “compliance”, “deviation”, or “alternate”. In the case of non-primary, vendor-supplied items, the name of the sub-vendor supplying said item, including model number, shall be indicated.

1. By noting the term “compliance”, it shall be understood that the manufacturer is in full compliance with the item specified and will provide exactly the same with no deviations.
2. By noting the term “deviation”, it shall be understood that the manufacturer prefers to provide a different component in lieu of that specified. Manufacturer shall indicate all deviations.
3. By noting the term “alternate”, it shall be understood that the manufacturer proposes to provide the same operating function but prefers to do it in a different manner. An alternate shall be fully described as to what the manufacturer proposes to provide.

B. Submit for review shop drawings on following:

1. Panelboard
2. Circuit breakers
3. Fuses

C. Manufacturer Seismic Qualification Certification: Submit certification that equipment specified in this section will withstand seismic forces defined in Section 260548, "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. 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."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Submit test report, for review by Engineer.

1.5 STANDARDS

A. Work of this Division shall conform to following standards, as applicable:

1. NEMA Instructions for Safe Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or less.

PART 2 - PRODUCTS

2.1 PANELBOARDS FOR GENERAL USE

A. Panelboards shall be by Square D, General Electric or Eaton Corporation. Refer to Contract Drawings for requirements on special ratings and auxiliary devices such as relays, contactors and time switches. Panelboards shall be UL listed and circuit breaker-equipped. Design shall be such that individual breakers can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as means of obtaining clearances as required by UL. Where “space only” is indicated, make provisions for future installation of breaker sized as indicated.

B. Panelboards shall conform to standards of NEMA PB-1. Panelboards shall have distributed phase bussing throughout. Support bus bars on bases independent of circuit breakers. Main buses and back pans shall be designed so that breakers may be changed without machining, drilling, or tapping. Provide isolated neutral bus in each panel for connection of circuit neutral conductors. Provide separate ground bus identified as equipment grounding bus for connecting grounding conductors; bond to steel cabinet. In addition to equipment grounding bus, provide second “isolated” ground bus, where indicated.

C. Panelboards shall have copper bussing.

D. For panelboards set flush in walls, provide a minimum of (2) spare 3/4" conduits and (1) spare 1-1/4" conduit in wall up to accessible wireway above finished ceiling for future installation of additional conductors.

E. Each cabinet shall have hinged locking metal door and card holder for directory. All locks shall be fitted to same key. Panelboard card directories shall be completely filled out (typewritten) upon completion of project and shall include source of service. Cover trims for panelboards shall be hinged to box with full height, semi-concealed piano hinges, fastened to box lip with screws, not trim clamps. Door shall be hinged. Trims shall be UL labeled.

F. 208Y/120 V Panelboards: Panelboard shall have main, lugs, branches, and circuit breakers as scheduled. Panelboards shall have a minimum rating of 22,000 A RMS symmetrical interrupting capacity unless scheduled otherwise. Series ratings are NOT acceptable.

1. Lighting and small power panelboards shall be Square D "NQ" with bolt-on breakers.
2. Power panelboards greater than 600A shall be Square D "I-Line" with bolt-on breakers.
3. Lighting or panel distribution boards shall be Square D "I-Line" with bolt-on breakers.

G. 480Y/277 V WYE and 480 V DELTA panelboards: Panelboards shall have main, lugs, branches and circuit breakers as scheduled. Panelboards shall have a minimum rating of 14,000 A RMS symmetrical interrupting capacity unless scheduled otherwise. Series ratings are NOT acceptable.

1. Lighting panelboards fed from a 480Y/277 V WYE source shall be Square D, Type NF with bolt-on breakers.
2. Power panelboards fed from a 480 V DELTA source shall be Square D "I-Line" with bolt-on breakers.
3. Lighting or panel distribution boards shall be Square D "I-Line" with bolt-on breakers.

H. Provide bolt-on thermal magnetic-type circuit breakers with interrupting capacity to match panelboard rating. Breaker terminals shall be UL listed as suitable for the type of conductor provided. Multiple circuit breakers shall be a common trip-type with single operating handle. Breaker design shall be such that overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phase's A, B, C, respectively.

I. Ground Fault Circuit Interrupter branch breakers for personnel protection shall be 20A single-pole molded case circuit breakers with neutral pigtail; shall sense current unbalance between branch circuit and its neutral and shall trip upon unbalance; shall be Class "A", 5 mA sensitivity; and shall be by same manufacturer as panelboards.

J. Ground Fault Circuit Interrupter branch breakers for heat trace cables and other applications requiring other than 4-6mA trip threshold shall be molded case circuit breakers with neutral pigtail in amperage rating and pole configurations required for the application; shall sense current unbalance between branch circuit and its neutral and shall trip upon unbalance; shall be Class "A", 30 mA sensitivity; and shall be by same manufacturer as panelboards.

K. Provide bolt-on arc-fault circuit interrupter (AFCI) 20A single pole molded case branch breakers with neutral pigtail where indicated. Breakers shall mitigate high current arcing faults in the complete circuit shall have same interrupting capacity to match panelboard rating. Maintain phase sequence throughout so that any three adjacent breaker poles are connected to Phases A, B and C, respectively. AFCI circuit breakers are not to be used in series with AFCI receptacles.

L. Fusible panelboards shall be Square D "QMB", or acceptable equivalent, and a minimum rating of 100,000 A RMS symmetrical interrupting capacity. Series ratings are NOT acceptable.

1. Provide Class R fuse clips in switches.
2. Individual switches shall have short circuit current rating of 100,000 A RMS minimum. Series ratings are NOT acceptable.
3. Provide fuses for branch devices in fusible panelboards. Fuses shall be Class RK-1, Bussman Type LPS-RK or acceptable equivalent by Gould Shawmut. Furnish one set (i.e., three) of spare fuses of each different rating, to owner.
4. Switches shall be lockable only in "OFF" position and accept three industrial type heaving duty padlocks.

M. Provide Factory Installed, Integral Surge Protective Devices (SPD) in panels that are part of the emergency power distribution system. The panel shall be labeled by an NRTL for compliance with UL 67 and UL 1449 after installing SPD.

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Advanced Protection Technologies Inc. (APT).
   b. Eaton Corporation.
   c. General Electric Company.
   d. Schneider Electric, SQ D Company.
   e. Cooper Bussman.

2. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 200 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

3. Protection modes and UL 1449 -3rd Edition for grounded wye circuits with 480Y/277 V or 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:

   a. Line to Neutral: 1200 V for 480Y/277 V or 700 V for 208Y/120 V.
   b. Line to Ground: 1200 V for 480Y/277 V or 700 V for 208Y/120 V.
   c. Neutral to Ground: 1200 V for 480Y/277 V or 700 V for 208Y/120 V.
   d. Line to Line: 2000 V for 480Y/277 V or 1200 V for 208Y/120 V.

4. Protection modes and UL 1449 -3rd Edition for 240/120-V, single-phase, three-wire circuits shall not exceed the following:

   a. Line to Neutral: 700 V.
   b. Line to Ground: 700 V.
   c. Neutral to Ground: 700 V.

d. Line to Line: 1200 V.

5. SCCR: Equal to 200 kA.
6. Nominal Discharge Surge Current Rating: 20 kA in conformance with UL-96A.

2.2 CIRCUIT BREAKERS FOR EXISTING PANELBOARDS

A. All new circuit breakers installed in existing panelboards shall match existing in style, manufacturer and interrupting rating for panel in which they are being installed, unless noted otherwise.

PART 3 - EXECUTION

3.1 GENERAL

A. The Electrical Contractor shall ensure that no piping, ductwork, leak protection apparatus or other equipment foreign to the electrical trade passes through the space equal to the width and depth of the electrical distribution equipment and extending from the floor to the structural ceiling.

3.2 INSTALLATION

A. Install equipment with manufacturer-recommended clearances and NEC-required clearances.

B. Install switchboards, motor control centers and other floor mounted equipment on concrete bases. Concrete bases are not required for transformers with bases that provide minimum 3-inch cavity between transformer bottom and floor. Concrete bases shall be 4 inches (100 mm) high, reinforced, with chamfered edges. Extend base no less than 6 inches (150 mm) in all directions beyond the maximum dimensions of equipment, unless otherwise indicated or required for seismic anchor support.

1. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."
2. Install dowel rods to connect concrete bases to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
3. Install epoxy-coated anchor bolts, for supported equipment, that extend through concrete base and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 SPECIAL CLEANING

A. Perform vacuum cleaning and wiping down of bus bars, bus bracing and supports in panelboards and electrical equipment enclosures. (Refer to cleaning requirements specified under DIVISION 1.)

B. Check bus connections and tighten bolts in panels within work areas, in accordance with manufacturer's torque requirements.

3.4 IDENTIFICATION

A. Provide nameplates and general identification as required under SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL WORK, and under DIVISION 1, and as follows.

B. Panelboard nameplate shall include following information:

1. Panelboard reference number.
2. Source panel reference, including circuit breaker supplying panelboard.
3. Location of source panel by building, floor level and room number.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trips.

C. Panelboard Load Balancing: After Substantial Completion, but not more than (60) days after Final Acceptance, measure load balancing and make circuit changes.

1. Measure during periods of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time acceptable to Owner. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20% between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 TESTING

A. Acceptance testing for electrical equipment, specified herein, shall be performed by independent testing firm with minimum ten-years of experience in testing the specified items. Firm shall be member of International Electrical Testing Association (INETA).

B. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

C. Testing procedures shall be as described in INETA "Acceptance Testing Specifications" (ATS).

D. Obtain circuit breaker and relay characteristic curves from manufacturer, prior to testing, and furnish copies to Architect.

E. Testing firm shall ensure busway system joint tightness, phasing and insulation resistance by test prior to energizing the system for the first time. Joint resistance shall be evaluated by a qualified person using equipment identified for the specific function. A written record of these tests shall be made available to the authority having jurisdiction.

F. Testing firm shall notify switchgear manufacturer in advance of dates on which acceptance tests will be performed so that manufacturer's representative may be present.

G. Testing firm shall immediately notify Contractor and Engineer, of any deficiencies requiring correction before switchboard is placed in service and shall confirm information in writing within five days.

H. Discrepancies found shall be corrected by firm which installed switchboard. However, testing firm shall make minor field adjustments that may be found necessary.

I. Testing scope shall include the following per current Edition of ANSI/NETA Standards for Acceptance Testing as outlined in Section 7:

1. Ground-fault protection systems including all circuit breakers with ground fault protection. Testing shall also be conducted in accordance with instructions provided with the equipment by the manufacturer.

J. Test report shall include typewritten test results on firm's standard test forms.

3.7 CIRCUIT BREAKER SETTINGS

A. Verify final trip settings for adjustable circuit breaker elements. Instantaneous magnetic settings shall be mid-range, unless otherwise noted.

3.8 PROTECTION

A. Temporary Heating: Apply temporary heat to electrical equipment according to manufacturer's written instructions, throughout periods when electrical equipment environment is not controlled for temperature and humidity within manufacturer's stipulated service conditions.

END OF SECTION 262400

STATE OF CONNECTICUT
UNIVERSITY OF CONNECTICUT

SUSAN HERBST
PRESIDENT

UCONN - STORRS CAMPUS
FINE ARTS BUILDING
A/C STUDY
PROJECT NO. 901667

100% Construction Documents

PREPARED BY:

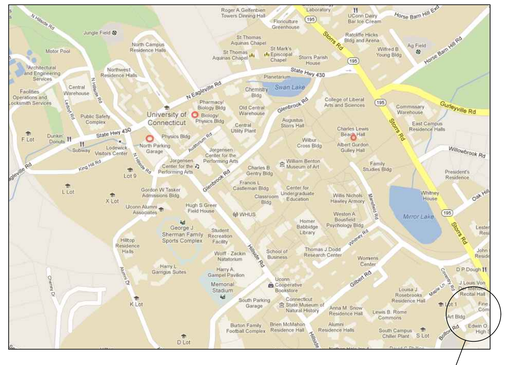
VAN ZELM ENGINEERS
VAN ZELM HEYWOOD & SHADFORD, INC.

CT: 860.284.5064 MA: 617.218.9976
10 TALCOTT NOTCH, FARMINGTON, CT 06032 - 1800
Connecticut | Massachusetts | North Carolina

PROJECT NO.: 2019031.00

NOVEMBER 8, 2019

LIST OF DRAWINGS



PROJECT LOCATION

NO SCALE

CONSULTANT:

REVISIONS:

MARK	DATE	DESCRIPTION

UNIVERSITY OF CONNECTICUT
ARCHITECTURAL & ENGINEERING SERVICES
31 LEDOYT ROAD UNIT 3038
STORRS, CONNECTICUT 06269-3038
TELEPHONE: (860) 486-3127
FACSIMILE: (860) 486-3177

PROJECT:
UCONN-
Fine Arts Building
Classrooms and
Practice Rooms
AC Replacement

KEYPLAN

PROJECT NO:	2019031.00
WORK ORDER NO:	901667
FILE NAME:	T:\2019\2019031.00\DWGS\A-COVR
AUTHOR:	RLG
DRAFTER:	RLG
SCALE:	NONE
PRINT DATE:	11/08/2019
SHEET TITLE:	COVER SHEET
SHEET:	G0.1
SHEET:	1 of 12

File Name: A-COVR.dwg
File Path: T:\2019\2019031.00\Dwgs
11/25/2019 3:07:01 PM User ID: Leiva, Mario J.

CONTROLS LEGEND

AI	ANALOG INPUT		FILTER
AO	ANALOG OUTPUT		SUPPLY FAN OR RETURN FAN
DI	DIGITAL INPUT		
DO	DIGITAL OUTPUT		
ES	END SWITCH		COOLING COIL
S	SWITCH		
H	HUMIDITY SENSOR		HEATING COIL
F	FLOW SENSOR		
P	PRESSURE SENSOR		MOTORIZED DAMPER
DP	DIFFERENTIAL PRESSURE SENSOR		STARTER/DISCONNECT
DS	DUCT SMOKE DETECTOR		
DH	DUCT HEAT DETECTOR		VARIABLE FREQUENCY DRIVE
LT	LOW TEMPERATURE THERMOSTAT (FREEZE)		
HT	HIGH TEMPERATURE THERMOSTAT	ACD	AUTOMATIC CONTROL DAMPER
M	MOTOR	C.R.	CONDENSATE RETURN
CO2	CO2 SENSOR	CHWR	CHILLED WATER RETURN
CI	ELECTRICAL CURRENT SWITCH/SENSOR	CHWS	CHILLED WATER SUPPLY
T	PNEUMATIC THERMOSTAT	FSD	FIRE SMOKE DAMPER
T	ELEC. THERMOSTAT OR ELEC. TEMP. SENSOR	MPS	MEDIUM PRESSURE STEAM
CCP	CENTRAL CONTROL PANEL	SD	SMOKE DAMPER

MECHANICAL LEGEND PIPING SYSTEMS

SYMBOL	DESCRIPTION
	BALL VALVE
	BUTTERFLY VALVE
	BALANCE VALVE
	CHECK VALVE
	STRAINER
	MULTI-PURPOSE VALVE
	GATE VALVE
	OUTSIDE SCREW & YOKE GATE VALVE (OS&Y)
	PUMP
	THERMOMETER
	PRESSURE GAUGE
	PRESSURE RELIEF VALVE
	PRESSURE REDUCING VALVE
	FLOAT & THERMOSTATIC TRAP ASSEMBLY
	INVERTED BUCKET TRAP ASSEMBLY
	AIR VENT (MANUAL OR AUTO.)
	BRANCH OFF TOP OF MAIN
	BRANCH OFF BOTTOM OF MAIN
	ELBOW, TURNED DOWN
	ELBOW, TURNED UP
	PIPING TO BE REMOVED
	DOMESTIC WATER MAKE UP
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
HGS	HOT GLYCOL SUPPLY
HGR	HOT GLYCOL RETURN
RL	REFRIGERANT LIQUID
RG	REFRIGERANT HOT GAS
RS	REFRIGERANT SUCTION
C	CONDENSATE DRAIN LINE

LEGEND NOTE

THESE ARE THE GENERAL LEGENDS OF SYMBOLS AND ABBREVIATIONS, AND SHALL BE USED AS A DICTIONARY TO DEFINE ITEMS INDICATED ON DRAWINGS. NOT ALL SYMBOLS OR ABBREVIATIONS DEFINED ARE NECESSARILY USED ON THIS PROJECT.

MECHANICAL LEGEND AIR SYSTEMS

SYMBOL	DESCRIPTION
	SUPPLY DUCT UP
	SUPPLY DUCT DOWN
	RETURN OR EXHAUST DUCT UP
	RETURN OR EXHAUST DUCT DN.
	EXISTING DUCT (SINGLE LINE)
	EXISTING DUCT (DOUBLE LINE)
	NEW DUCT (SINGLE LINE)
	NEW DUCT (DOUBLE LINE)
	ACOUSTICALLY LINED DUCT (SINGLE LINE)
	ACOUSTICALLY LINED DUCT (DOUBLE LINE)
	DUCT TO BE REMOVED (SINGLE LINE)
	DUCT TO BE REMOVED (DOUBLE LINE)
	FLUSH CAP, SINGLE LINE
	SUPPLY DIFFUSER
	RETURN/EXHAUST GRILLE
	LINEAR DIFFUSER
	SUPPLY AIR FLOW
	RETURN/EXHAUST AIR FLOW
LD	LOUVER DOOR (SIZE AS NOTED)
UD	UNDER CUT DOOR
	REHEAT COIL
	VARIABLE AIR VOLUME BOX
	VARIABLE AIR VOLUME W/ REHEAT COIL
	VARIABLE AIR VOLUME W/SOUND ATTENUATOR
	VARIABLE AIR VOLUME W/ATTEN. & REHEAT
	LABORATORY AIR FLOW VALVE
	LABORATORY AIR FLOW VALVE W/ REHEAT COIL
VD	VOLUME DAMPER (PLAN VIEW)
FD	FIRE DAMPER (PLAN VIEW)
GD	GRAVITY DAMPER (PLAN VIEW)
SD	SMOKE DAMPER (PLAN VIEW)
FSD	FIRE SMOKE DAMPER (PLAN VIEW)
ACD	AUTOMATIC CONTROL DAMPER (PLAN VIEW)
	HUMIDIFIER

MECHANICAL LEGEND ABBREVIATIONS & GENERAL SYMBOLS

SYMBOL	DESCRIPTION
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
CA	COMBUSTION AIR
CUH	CABINET UNIT HEATER
EA	EXHAUST AIR
EF	EXHAUST FAN
FCU	FAN COIL UNIT
FTR	FINNED TUBE RADIATION
HRU	HEAT RECOVERY UNIT
HWC	HOT WATER COIL
MAU	MAKE-UP AIR UNIT
OA	OUTSIDE AIR
RA	RETURN AIR
RHC	REHEAT COIL
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
SATT	SOUND ATTENUATOR
UH	UNIT HEATER
VFD	VARIABLE FREQUENCY DRIVE
	DEMOLITION WORK: POINT OF REMOVAL NEW WORK: POINT OF ATTACHMENT

MECHANICAL GENERAL NOTES

1. THIS IS A RENOVATION PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL LABOR, SERVICES, AND MATERIALS FOR COMPLETION OF THIS PROJECT AS SHOWN AND IMPLIED IN THESE DOCUMENTS AND SPECIFICATIONS.
2. CONTRACTOR IS RESPONSIBLE FOR ALL ASPECTS OF NEW SYSTEM INSTALLATION INCLUDING DEMOLITION, INSTALLATION, RIGGING, STARTUP, PATCHING AND REPAIRING, TOUCH UP, PAINTING, AND CLEAN UP.
3. EXISTING EQUIPMENT AND COMPONENT LOCATIONS, SIZES SHOWN ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY CONDITIONS PRIOR TO COMMENCEMENT OF ANY WORK.
4. THE CONTRACTOR IS RESPONSIBLE FOR SAFE STORAGE FOR ALL REMOVED COMPONENTS TO BE REUSED.
5. PROVIDE NEW EQUIPMENT, PIPING, CONTROLS, AS SHOWN, SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. COORDINATE NEW SYSTEM LOCATIONS, PIPE ROUTING WITH OWNER.
6. NEW SYSTEM INSTALLATION LAYOUT BASED ON AVAILABLE INFORMATION OF EXISTING SYSTEMS AND STRUCTURE. THE INSTALLING CONTRACTOR TO COORDINATE NEW LAYOUT WITH ACTUAL SITE CONDITIONS.
7. THIS PLAN IS GENERALLY SCHEMATIC IN NATURE. EVERY COMPONENT, FITTING, ETC. IS NOT SHOWN. PROVIDE SUCH COMPONENTS AS REQUIRED FOR COMPLETE INSTALLATION, PROPERLY COORDINATED WITH ALL TRADES.
8. INSTALL ACCESS DOORS AT ALL COILS, DAMPERS AND CONTROL DEVICES.
9. ALL MATERIALS, METHODS AND EQUIPMENT INSTALLED UNDER THIS CONTRACT SHALL BE IN COMPLIANCE WITH ALL APPLICABLE CODES AND REGULATIONS.
10. PROVIDE SEISMIC RESTRAINTS ON ALL EQUIPMENT AND PIPING IN COMPLIANCE WITH PROJECT SPECIFICATIONS AND APPLICABLE CODES.
11. THERMOSTAT AND SWITCH LOCATIONS SHALL BE GENERALLY AS SHOWN. ACTUAL LOCATIONS SHALL BE COORDINATED WITH THE ARCHITECTURAL DRAWINGS.
12. ALL PENETRATIONS TO BE SEALED WEATHER TIGHT. FIRE CAULKED AS NEEDED, BASED ON EXISTING CONSTRUCTION.
13. DUCTWORK, PIPING, ETC. NOT SERVING STAIRWELL AREAS SHALL NOT PENETRATE STAIRWELL WALLS.

MECHANICAL DEMOLITION NOTES

A. DEMOLITION SCOPE INCLUDES REMOVAL / CUTTING EXISTING SYSTEMS TO FACILITATE NEW EQUIPMENT. FIELD VERIFY SCOPE AND COORDINATE WITH OWNER PRIOR TO START OF WORK.

B. ALL NEW INSULATION SHALL MATCH EXISTING. PATCH ALL EXISTING INSULATION WHERE REMOVED OR DAMAGED.

C. PROPERLY DISPOSE OF ALL REMOVED MECHANICAL ITEMS.

D. NOTIFY CONSTRUCTION MANAGER OR GENERAL CONTRACTOR OF OPENINGS CAUSED BY REMOVAL OF EXISTING EQUIPMENT. ENSURE THAT PATCHING AND WEATHERPROOFING IS COMPLETE.

E. ANY WORK THAT COULD DISRUPT OTHER BUILDING OCCUPANTS TO BE COORDINATED AND SCHEDULED WITH BUILDING MANAGEMENT PRIOR TO EXECUTION OF THE WORK.

CONSULTANT:

VANZELM ENGINEERS

VAN ZELM HEYWOOD & SHADFORD, INC.

CT: 860.284.5064 MA: 617.218.9976

10 TALCOTT NOTCH, FARMINGTON, CT 06032 - 1800

Connecticut | Massachusetts | North Carolina

PROJECT NO.: 2019031.00

REVISIONS:

MARK	DATE:	DESCRIPTION

UNIVERSITY OF CONNECTICUT
ARCHITECTURAL & ENGINEERING SERVICES
31 LEDOYT ROAD UNIT 3038
STORRS, CONNECTICUT 06269-3038
TELEPHONE: (860) 486-3127
FACSIMILE: (860) 486-3177

PROJECT:

UCONN-
Fine Arts Building
Classrooms and
Practice Rooms
AC Replacement

PROJECT NO: 2019031.00

WORK ORDER NO: 901667

FILE NAME:
T:\2019\2019031.00\DWGS\MECHANICAL - BUILDING V2\M001-LGND

AUTHOR: WPA

DRAFTER: WPA

SCALE: NONE

PRINT DATE: 11/08/2019

SHEET TITLE:

MECHANICAL
LEGENDS AND
GENERAL NOTES

SHEET:

M0.1

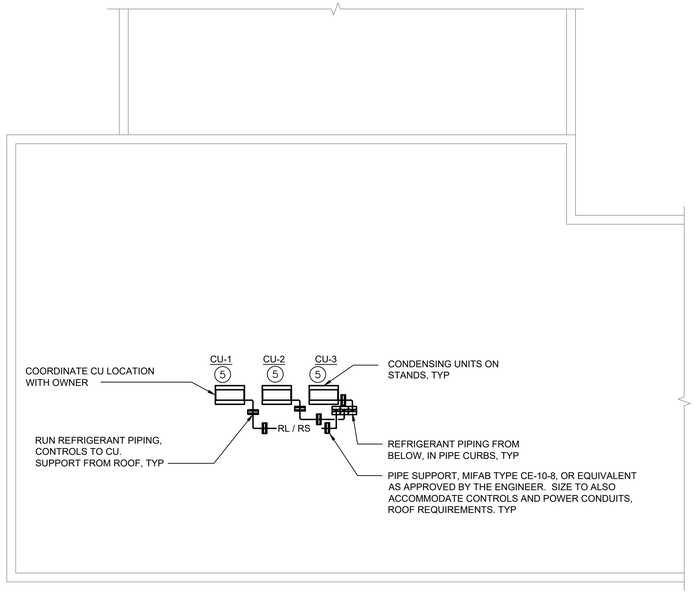
SHEET: 2 of 12

DRAWING GENERAL NOTES

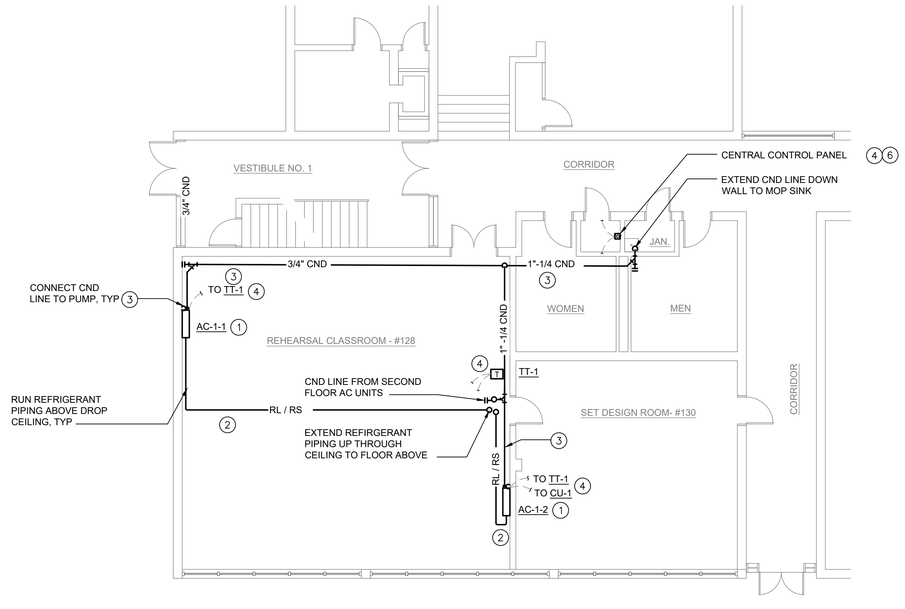
1. PIPING LAYOUT EQUIPMENT LOCATION TO BE USED AS A GUIDE INSTALL ALL COMPONENTS IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS. VERIFY PIPE RUNS IN FIELD AND COORDINATE WITH OWNER.
2. COORDINATE ALL WORK WITH OTHER TRADES, OWNER, PRIOR TO INSTALLATION OF COMPONENTS.
3. SEAL ALL INTERIOR WALL PENETRATIONS TO REDUCE SOUND TRANSMISSION AND FIRESTOP PENETRATIONS THROUGH RATED WALLS.
4. SUPPORT ALL PIPING FROM CEILING AND WALLS, IN ACCORDANCE WITH SPECIFICATIONS.
5. CONDENSATE DRAIN PIPING TO BE COPPER. PITCH TO DRAIN. PROVIDE CLEANOUTS AT ALL 90° TURNS.
6. RUN CONTROLS WIRING UP IN WALLS, ABOVE CEILING, WHERE POSSIBLE. ALL EXPOSED CONTROL WIRING TO BE IN CONDUIT. CONDUIT BY DIV 26. WIRING INSTALLED BY DIV 23. PROVIDE ALL PROGRAMING.
7. VERIFY WITH CU/AC EQUIPMENT MANUFACTURER COMPLIANCE WITH ASHRAE 15.

DRAWING KEY NOTES

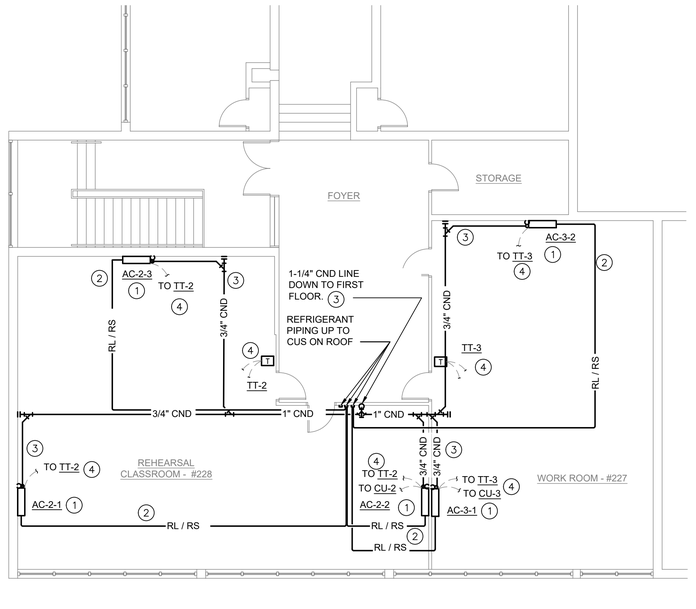
1. INSTALL WALL MOUNTED INDOOR COOLING AC UNITS. COORDINATE LOCATIONS WITH OWNER. COORDINATE POWER WITH DIV 26.
2. RUN REFRIGERANT PIPING, FROM AC UNITS TO CONDENSING UNITS MOUNTED ON ROOF. INSULATE. RUN PIPING IN LINE-HIDE, SUPPORT FROM WALLS.
3. RUN CONDENSATE DRAIN FROM CONDENSATE PUMPS AT AC UNITS, TO JANITORS CLOSET AS SHOWN. INSULATE AND PROVIDE PVC COVER. PITCH PIPING TO DRAIN.
4. INSTALL CONTROLS AND WIRING. CONNECT LOCAL SENSORS (TT) TO AC UNITS. CONNECT AC UNITS TO CU. CONNECT CU TO CENTRAL CONTROL PANEL (CCP). VERIFY WIRING WITH MANUFACTURER. CONNECT CCP TO CAMPUS BAS (BACNET). INCLUDE ALL PROGRAMMING.
5. INSTALL CU UNITS ON ROOF. LOCATION SHOWN IS APPROXIMATE. MAINTAIN MIN 10' CLEARANCES TO ROOF EDGE. SEE DETAIL. COORDINATE WITH DIV 26 FOR POWER.
6. PROVIDE CONTROLS INTERLOCK BETWEEN COOLING AND HEATING TO PREVENT SIMULTANEOUS OPERATION. COORDINATE WITH DIV 26, AC EQUIPMENT VENDOR.



3 MECHANICAL NEW WORK ROOF PART PLAN - BUILDING 'C'
SCALE: 1/8" = 1'-0"



1 MECHANICAL NEW WORK FIRST FLOOR PART PLAN - BUILDING 'C'
SCALE: 1/8" = 1'-0"



2 MECHANICAL NEW WORK SECOND FLOOR PART PLAN - BUILDING 'C'
SCALE: 1/8" = 1'-0"

PLAN NORTH

CONSULTANT:

VAN ZELM ENGINEERS
VAN ZELM HEYWOOD & SHADFORD, INC.
CT: 860.284.5064 MA: 617.218.9976
10 TALCOTT NOTCH, FARMINGTON, CT 06032 - 1800
Connecticut | Massachusetts | North Carolina

PROJECT NO.: 2019031.00

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PROJECT:
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Fine Arts Building
Classrooms and
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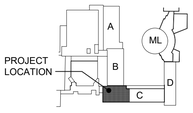


KEYPLAN

PROJECT NO:	2019031.00
WORK ORDER NO:	901667
FILE NAME:	T:\2019\2019031.00\DWGS\MECHANICAL - BUILDING 'C'\M101-FL01
AUTHOR:	WPA
DRAFTER:	WPA
SCALE:	AS NOTED
PRINT DATE:	11/08/2019

SHEET TITLE:
MECHANICAL
NEW WORK
PART PLANS -
BUILDING 'C'

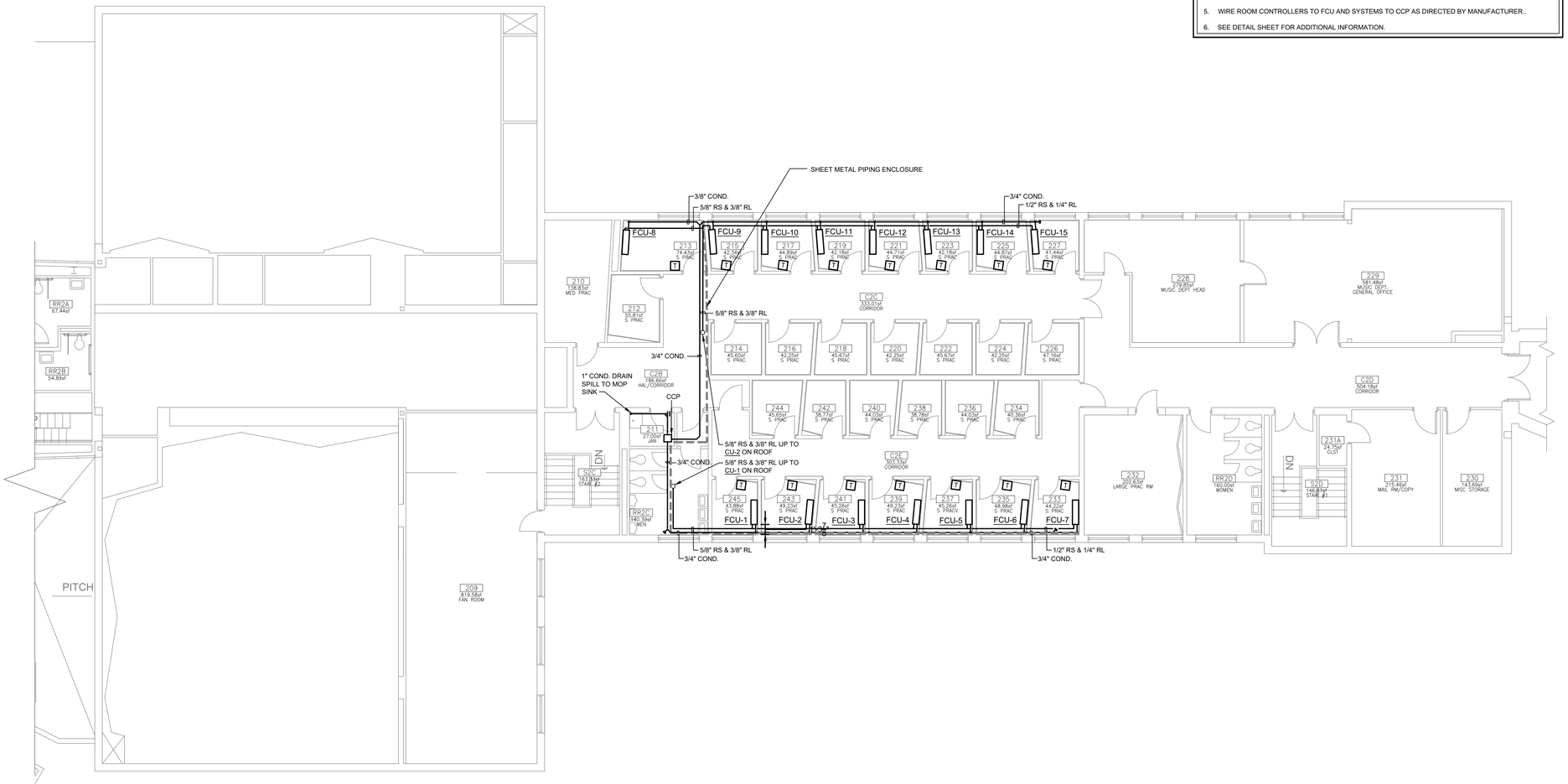
SHEET:

M1.0

SHEET: 3 of 12

DRAWING GENERAL NOTES

1. INSTALL INDOOR UNITS (FCU) ON INTERIOR WALL AS HIGH AS POSSIBLE.
2. SUPPORT HORIZONTAL REFRIGERANT AND CONDENSATE PIPING FROM UNISTRUT ATTACHED TO INTERIOR WALLS AND CEILING SUPPORT STRUCTURE.
3. PROVIDE "LINE HIDE" PIPING COVER FOR ALL VERTICAL AND HORIZONTAL PIPING.
4. SEAL ALL INTERIOR WALL PIPING PENETRATIONS TO REDUCE SOUND TRANSMISSION AND FIRESTOP PENETRATIONS THROUGH RATED WALLS.
5. WIRE ROOM CONTROLLERS TO FCU AND SYSTEMS TO CCP AS DIRECTED BY MANUFACTURER..
6. SEE DETAIL SHEET FOR ADDITIONAL INFORMATION.



1 SECOND FLOOR MECHANICAL PLAN - BUILDING 'E'
SCALE: 1/8" = 1'-0"

PLAN NORTH

CONSULTANT:
VAN ZELM ENGINEERS
VAN ZELM HEYWOOD & SHADFORD, INC.
CT: 860.284.5064 MA: 617.218.9976
10 TALCOTT NOTCH, FARMINGTON, CT 06032 - 1800
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PROJECT NO.: 2019031.00

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FACSIMILE: (860) 486-3177

PROJECT:
UCONN-
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Classrooms and
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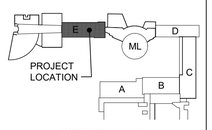
AC Replacement



KEYPLAN

PROJECT NO:	2019031.00
WORK ORDER NO:	901667
FILE NAME:	T:\2019\2019031.00\DWGS\MECHANICAL - BUILDING 'E'\M101-FL01
AUTHOR:	WPA
DRAFTER:	WPA
SCALE:	AS NOTED
PRINT DATE:	11/08/2019

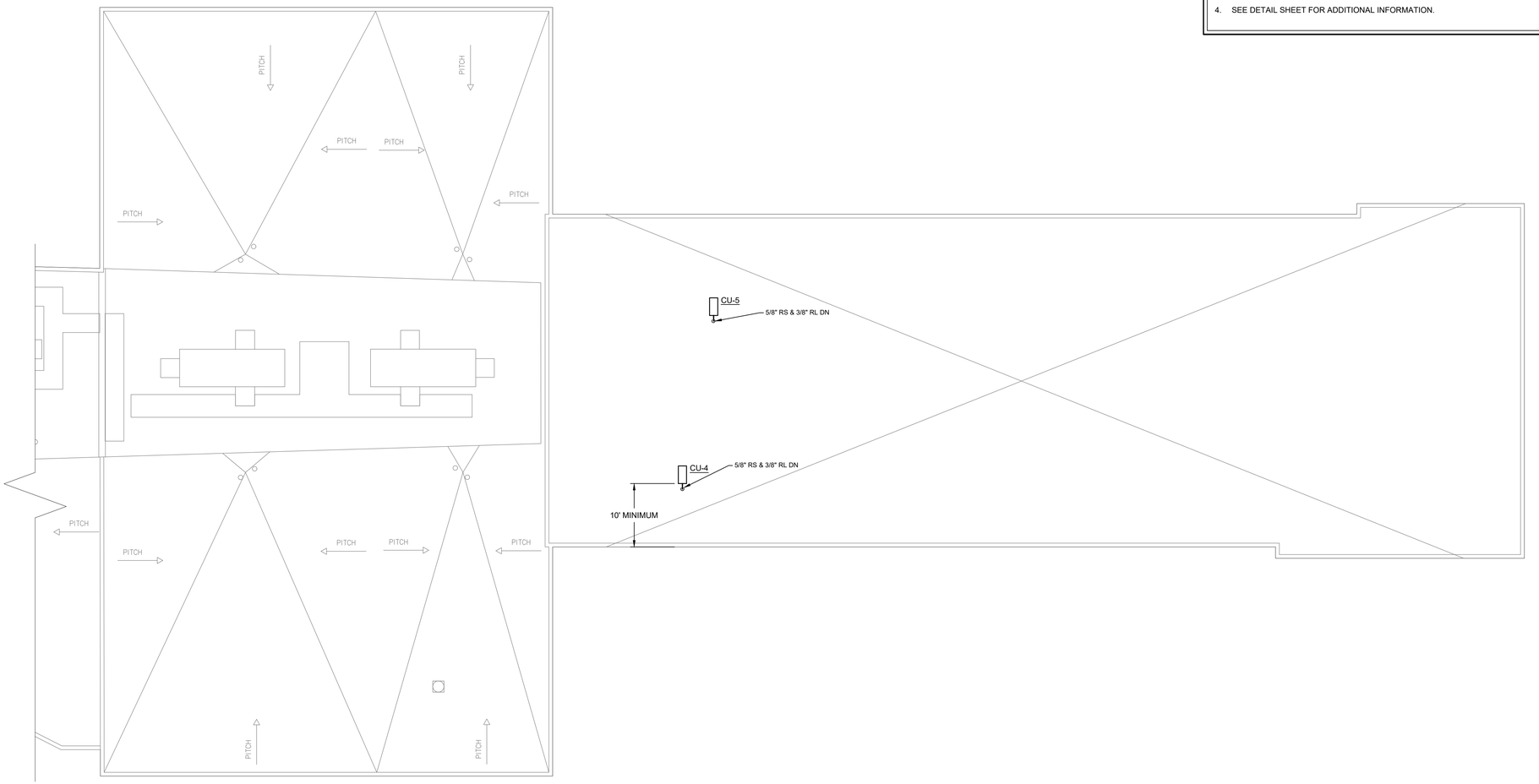
SHEET TITLE:
MECHANICAL
NEW WORK
SECOND FLOOR PLAN -
BUILDING 'E'

SHEET:
M2.0

SHEET: 4 of 12

DRAWING GENERAL NOTES

1. INSTALL OUTDOOR UNITS (CUS) ON THE ROOF, MAINTAINING CLEARANCE TO EDGES AS SHOWN.
2. SUPPORT REFRIGERANT PIPING FROM ROOF DECK.
3. SEAL ALL EXTERIOR ROOF PIPING PENETRATIONS WEATHER TIGHT AND FIRESTOP PENETRATIONS THROUGH RATED ASSEMBLIES
4. SEE DETAIL SHEET FOR ADDITIONAL INFORMATION.



1 MECHANICAL ROOF PLAN - BUILDING 'E'
SCALE: 1/8" = 1'-0"

PLAN NORTH

CONSULTANT:

VAN ZELM ENGINEERS
VAN ZELM HEYWOOD & SHADFORD, INC.
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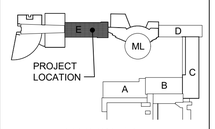


KEYPLAN

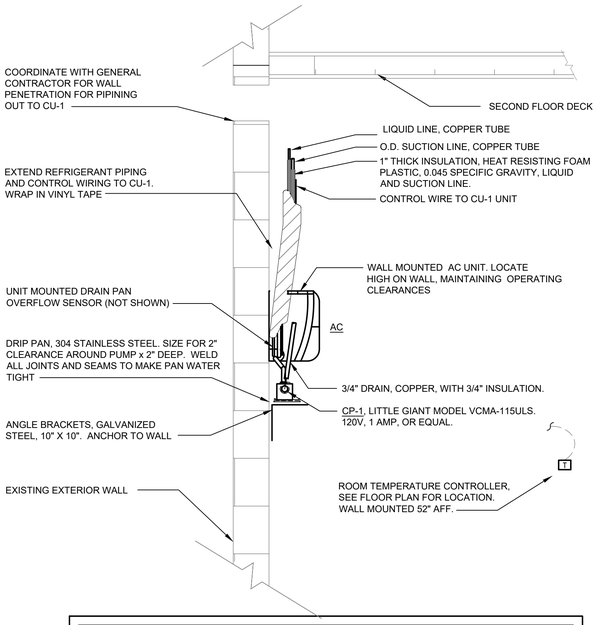
PROJECT NO:	2019031.00
WORK ORDER NO:	901667
FILE NAME:	T:\2019\2019031.00\DWGS\MECHANICAL - BUILDING 'E'\M101-FL01
AUTHOR:	WPA
DRAFTER:	WPA
SCALE:	AS NOTED
PRINT DATE:	11/08/2019

SHEET TITLE:
MECHANICAL
NEW WORK
ROOF PLAN -
BUILDING 'E'

SHEET:

M3.0

File Name:M101-FL01.dwg
File Path: T:\2019\2019031.00\Dwgs\Mechanical - Building 'E'
11/25/2019 3:07:13 PM User ID: Leiva, Mario J.

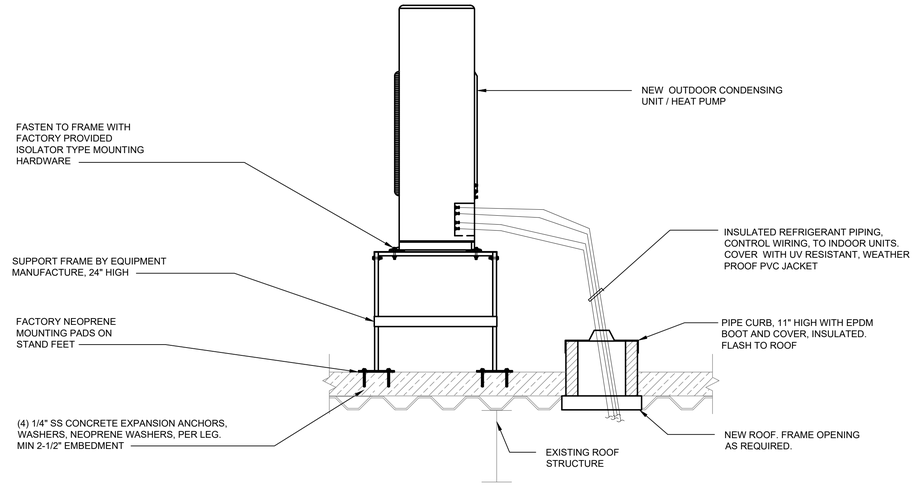


DETAIL NOTES:

1. INSTALL AC UNITS IN ACCORDANCE WITH ALL MANUFACTURER'S INSTRUCTIONS. CHECK FOR EXISTING OBSTRUCTIONS PRIOR TO INSTALLATION. MAINTAIN RECOMMENDED SERVICE CLEARANCES.
2. COORDINATE UNIT AND THERMOSTAT LOCATION WITH OWNER, OTHER TRADES.
3. CONTRACTOR RESPONSIBLE FOR ALL REFRIGERANT CHARGE, AND SYSTEM STARTUP.
4. LOW VOLTAGE WIRING BETWEEN CU AND FCU AND FCU TO T-STAT BY DIVISION 23. ALL CONDUIT AND POWER WIRING BY DIVISION 26. COORDINATE WITH DIVISION 26.
5. SEE INSTALLATION OPERATION MANUAL FOR REFRIGERANT LINE AND CONNECTION SIZES.
6. PROVIDE FIELD INSTALLED ISOLATION VALVES, NOT SHOWN.
7. COVER ALL EXPOSED REFRIGERANT PIPING WITH "LINE HIDE" (NOT SHOWN).
8. MOUNT CONDENSATE DRAIN PUMP IN DRAIN PAN, BELOW ELEVATION OF AC.
9. AC SEQUENCE OF OPERATION:
   - SET TO AUTO COOL MODE.
   - SYSTEM TO MODULATE TO MAINTAIN SPACE SET POINT OF 75° (ADJUSTABLE).
   - ALARM NOTIFICATION IF SPACE IS ABOVE 80°F OR AUX DRAIN PAN SENSOR ACTIVATION

1 AC UNIT MOUNTING AND PIPING DETAIL

SCALE: NOT TO SCALE



DETAIL NOTES:

1. INSTALL OUTDOOR UNIT ON ROOF OF BUILDING AS SHOWN ON PLANS. INSTALL PER MANUFACTURERS. MAINTAIN OPERATIONAL AND SERVICE CLEARANCES.
2. COORDINATE WITH OWNERS ROOFER FOR FLASHING DETAILS, ROOF CONSTRUCTION, ANCHORING COMPONENTS, INSULATION, SEALING PENETRATIONS WEATHER TIGHT, WEATHER PROOFING. HAVE OWNERS ROOFER INSPECT AFTER INSTALLATION FOR WARRANTY PRESERVATION.
3. VERIFY EQUIPMENT LOCATIONS WITH MANUFACTURER AND OWNER PRIOR TO INSTALLATION. MAINTAIN IBC CLEARANCES TO ROOF EDGE, OR PROVIDE GUARDS, AS REQUIRED.
4. COORDINATE WITH DIVISION 26 FOR POWER WIRING AND PIPE/CONDUIT RUNS TO INDOOR UNIT.
5. REFER TO OWNERS MANUAL FOR ALL CONNECTION SIZES.
6. PROVIDE STARTUP BY FACTORY CERTIFIED TECHNICIAN.

2 CU MOUNTING AND PIPING DETAIL

SCALE: NOT TO SCALE

OUTDOOR / CONDENSING UNIT SCHEDULE

UNIT NO.	LOCATION	SERVING	MANUFACTURER	MODEL & SIZE	COOLING /HEATING MBH	SEER BTU/H/W		COND. FAN DATA			COMPRESSOR DATA			MCA AMPS	MOCP AMPS	PH	VOLTS	REMARKS
								NO.	W	RPM	NO.	% STEPS	KW					
CU-1	BUILDING ROOF	AC-1- 1, AC-1-2	MITSUBISHI	MXZ-8C48NA	48.0/ 54.0	18.9	-	1	-	-	1	INVERTER	-	37.0	40	1	208	SEE NOTES 1, 2, 3, 4, 5, 6
CU-2	BUILDING ROOF	AC-2-1, AC-2-2, AC-2-3	MITSUBISHI	MXZ-8C48NA	48.0/ 54.0	18.9	-	1	-	-	1	INVERTER	-	37.0	40	1	208	SEE NOTES 1, 2, 3, 4, 5, 6
CU-3	BUILDING ROOF	AC-3-1, AC-3-2	MITSUBISHI	MXZ-3C36NA2	35.4/ 36.0	19.2	-	1	-	-	1	INVERTER	-	22.1	25	1	208	SEE NOTES 1, 2, 3, 4, 5, 6, 7

NOTES:
1. RATED COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB)
2. RATED HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 47°F (WB)
3. EFFICIENCY VALUES FOR EER, IEER, COP ARE BASED ON AHRI 1230 TEST METHOD FOR MIXTURE OF DUCTED & NON-DUCTED INDOOR UNITS.
4. QSMS MOUNTING BASE
5. INCLUDE FACTORY STARTUP BY FACTORY TECHNICIAN; ALL REFRIGERANT; CONTROLS PROGRAMING.
6. REFRIGERANT ISOLATION VALVES AT UNIT CONNECTION. BRANCH BOXES AS REQUIRED.
7. CCP, CENTRAL CONTROL PANEL- EW-50A, INCLUDING ADAPTERS, BAS INTERFACE MODULE, WALL MOUNT ELECTRICAL BOX

INDOOR UNIT / EVAPORATOR SCHEDULE

INDOOR UNIT DATA					OUTSIDE AIR CFM	FAN	UNIT OUTPUT, BTU/H		SOUND, dB (A) AT HI SPEED	ELECTRICAL				REMARKS
UNIT NO.	LOCATION	SERVING	MANUFACTURER	MODEL		CFM, DRY HI SPEED	COOL, MBH MAX	HEAT MBH		VOLTS-PH-HZ	HP / WATTS	MCA	MOCP	
AC-1-1	RM 128	REHEARSAL ROOM	MITSUBISHI	MSZFH18NA2	-	459	17.2	20.3	47	POWERED BY CU-1	30	1	-	SEE NOTE 1, 2, 3, 4, 5, 6
AC-1-2	RM 128	REHEARSAL ROOM	MITSUBISHI	MSZFH18NA2	-	459	17.2	20.3	47	POWERED BY CU-1	30	1	-	SEE NOTE 1, 2, 3, 4, 5, 6, 7
AC-2-1	RM 228	REHEARSAL ROOM	MITSUBISHI	MSZFH18NA2	-	459	17.2	20.3	47	POWERED BY CU-2	30	1	-	SEE NOTE 1, 2, 3, 4, 5, 6
AC-2-2	RM 228	REHEARSAL ROOM	MITSUBISHI	MSZFH18NA2	-	459	17.2	20.3	47	POWERED BY CU-2	30	1	-	SEE NOTE 1, 2, 3, 4, 5, 6
AC-2-3	RM 228	REHEARSAL ROOM	MITSUBISHI	MSZFH12NA	-	398	12.0	13.6	42	POWERED BY CU-2	30	1	-	SEE NOTE 1, 2, 3, 4, 5, 6 7
AC-3-1	RM 227	WORK ROOM	MITSUBISHI	MSZFH12NA	-	411	15.0	18.0	46	POWERED BY CU-3	30	1	-	SEE NOTE 1, 2, 3, 4, 5, 6
AC-3-2	RM 227	WORK ROOM	MITSUBISHI	MSZFH12NA	-	411	15.0	18.0	46	POWERED BY CU-3	30	1	-	SEE NOTE 1, 2, 3, 4, 5, 6, 7

NOTES:
1. NOMINAL COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB).
2. NOMINAL HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 43°F (WB)
3. SEE OUTDOOR UNIT SCHEDULE FOR OUTDOOR AMBIENT CONDITIONS, CONNECTED CAPACITY, AND OTHER FACTORS ASSOCIATED WITH CORRECTED CAPACITIES.
4. FIELD SUPPLIED AND MOUNTED CONDENSATE LIFT DEVICE.
5. FACTORY OPTIONS: DPLS2 DRAIN PAN SENSOR
6. CN24 RELAY KIT FOR BASEBOARD HEAT INTERLOCK.
7. PAC-YT53CRAU CONTROLLER AND CONTROL INTERFACE

CONSULTANT:

VAN ZELM ENGINEERS

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UCONN-
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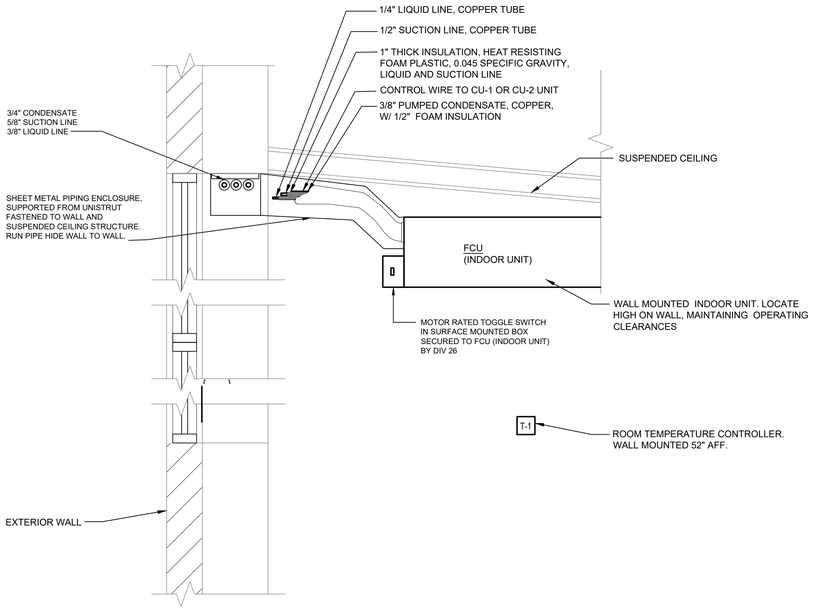
FILE NAME: T:\2019\2019031.00\DWGS\MECHANICAL - BUILDING 'C'\M401-DETAIL
AUTHOR: WPA
DRAFTER: WPA
SCALE: NONE
PRINT DATE: 11/08/2019
SHEET TITLE:

MECHANICAL SCHEDULES AND DETAILS - BUILDING 'C'

SHEET:

M4.1

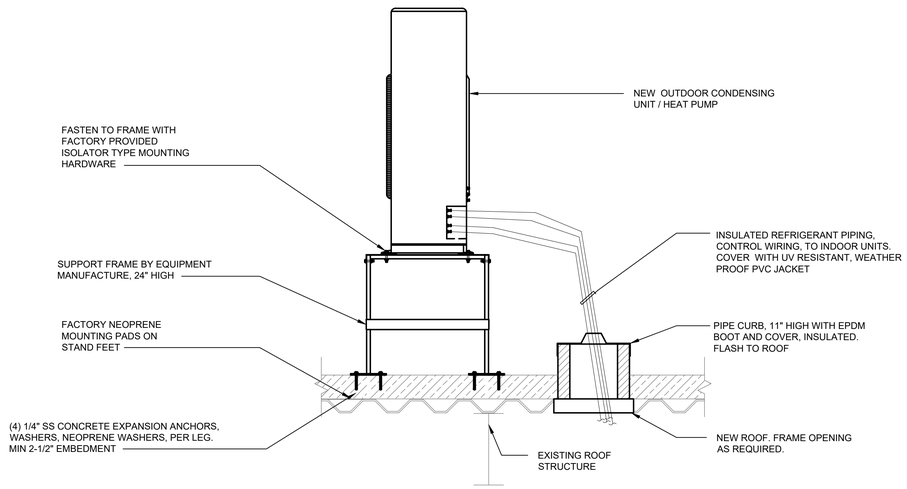
SHEET: 6 of 12



DETAIL NOTES:

1. INSTALL FCU INDOOR UNITS IN ACCORDANCE WITH ALL MANUFACTURER'S REQUREMENTS AND INSTRUCTIONS. COORDINATE FOR EXISTING OBSTRUCTIONS PRIOR TO INSTALLATION. MAINTAIN RECOMMENDED SERVICE CLEARANCES.
2. COORDINATE UNIT AND THERMOSTAT LOCATION WITH OWNER, OTHER TRADES.
3. CONTRACTOR RESPONSIBLE FOR ALL REFRIGERANT CHARGE, AND SYSTEM STARTUP.
4. LOW VOLTAGE WIRING BETWEEN CU AND FCU AND FCU TO T-STAT BY DIVISION 23. ALL CONDUIT AND POWER WIRING BY DIVISION 26. COORDINATE WITH DIVISION 26.
5. SEE INSTALLATION / OPERATION MANUAL FOR REFRIGERANT LINE AND CONNECTION SIZES.
6. PROVIDE FIELD INSTALLED ISOLATION VALVES AT EACH UNIT, NOT SHOWN.
7. COVER ALL EXPOSED REFRIGERANT PIPING WITH "LINE HIDE".
8. MOUNT CONDENSATE DRAIN PUMP IN CASING OF AC.
9. INTERLOCK FCU WITH HEATING SYSTEM TO PREVENT SIMULTANEOUS HEATING / COOLING.
10. AC SEQUENCE OF OPERATION:
    - SET TO AUTO COOL MODE.
    - SYSTEM TO MODULATE TO MAINTAIN SPACE SET POINT OF 75° (ADJUSTABLE).
    - ALARM NOTIFICATION IF SPACE IS ABOVE 80°F OR AUX DRAIN PAN SENSOR ACTIVATION

1 TYPICAL FCU MOUNTING AND PIPING DETAIL
SCALE: NOT TO SCALE



DETAIL NOTES:

1. INSTALL OUTDOOR UNIT ON ROOF OF BUILDING AS SHOWN ON PLANS. INSTALL PER MANUFACTURERS. MAINTAIN OPERATIONAL AND SERVICE CLEARANCES.
2. COORDINATE WITH OWNERS ROOFER FOR FLASHING DETAILS, ROOF CONSTRUCTION, ANCHORING COMPONENTS, INSULATION, SEALING PENETRATIONS WEATHER TIGHT, WEATHER PROOFING. HAVE OWNERS ROOFER INSPECT AFTER INSTALLATION FOR WARRANTY PRESERVATION.
3. VERIFY EQUIPMENT LOCATIONS WITH MANUFACTURER AND OWNER PRIOR TO INSTALLATION. MAINTAIN IBC CLEARANCES TO ROOF EDGE, OR PROVIDE GUARDS, AS REQUIRED.
4. COORDINATE WITH DIVISION 26 FOR POWER WIRING AND PIPE/CONDUIT RUNS TO INDOOR UNIT.
5. REFER TO OWNERS MANUAL FOR ALL CONNECTION SIZES.
6. PROVIDE STARTUP BY FACTORY CERTIFIED TECHNICIAN.

2 CU MOUNTING AND PIPING DETAIL
SCALE: NOT TO SCALE

OUTDOOR / CONDENSING UNIT SCHEDULE

UNIT NO.	LOCATION	SERVING	MANUFACTURER	MODEL & SIZE	COOLING /HEATING MBH	SEER BTU/H/W		COND. FAN DATA			COMPRESSOR DATA			MCA AMPS	MOCP AMPS	PH	VOLTS	REMARKS
								NO.	W	CFM	NO.	% STEPS	KW					
CU-4	BUILDING ROOF	FCU- 1 - 7	MITSUBISHI	PUMY-P48NKMU	48.0/ 54.0	16.5 / 20.2	-	2	74	3,885	1	INVERTER	3.3	31	44	1	208	SEE NOTES 1, 2, 3, 4, 5, 6
CU-5	BUILDING ROOF	FCU 8 - 15	MITSUBISHI	PUMY-P48NKMU	48.0/ 54.0	16.5 / 20.2	-	2	74	3,885	1	INVERTER	3.3	31	44	1	208	SEE NOTES 1, 2, 3, 4, 5, 6, 7

NOTES:
1. RATED COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB)
2. RATED HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 47°F (WB)
3. EFFICIENCY VALUES FOR EER, IEER, COP ARE BASED ON AHRI 1230 TEST METHOD FOR MIXTURE OF DUCTED & NON-DUCTED INDOOR UNITS.
4. QSMS MOUNTING BASE
5. INCLUDE FACTORY STARTUP BY FACTORY TECHNICIAN; ALL REFRIGERANT; CONTROLS PROGRAMING.
6. REFRIGERANT ISOLATION VALVES AT UNIT CONNECTION. BRANCH BOXES AS REQUIRED.
7. CCP, CENTRAL CONTROL PANEL- Ew-50A, INCLUDING ADAPTERS, BAS INTERFACE MODULE, WALL MOUNT ELECTRICAL BOX

INDOOR UNIT / EVAPORATOR SCHEDULE

INDOOR UNIT DATA					OUTSIDE AIR CFM	FAN	UNIT OUTPUT, BTU/H		SOUND, dB (A) AT HI SPEED	ELECTRICAL				REMARKS
UNIT NO.	LOCATION	SERVING	MANUFACTURER	MODEL		CFM, DRY HI SPEED	COOL, MBH MAX	HEAT MBH		VOLTS-PH-HZ	HP / WATTS	MCA	MOCP	
FCU-1	RM 233	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU-2	RM 235	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU-3	RM 237	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU-4	RM 239	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU-5	RM 241	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 6	RM 243	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 7	RM 245	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 8	RM 213	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 9	RM 215	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 10	RM 217	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 11	RM 219	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 12	RM 221	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 13	RM 223	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 14	RM 225	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	30	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
FCU- 15	RM 227	PRACTICE ROOM	MITSUBISHI	PKFY-P06NBMU-E2R1	0	208	6.0	6.7	36	208V - 1Ø	L	0.19	15	SEE NOTE 1, 2, 3, 4, 5, 6
														SEE NOTE 1, 2, 3, 4, 5, 6

NOTES:
1. NOMINAL COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB).
2. NOMINAL HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 43°F (WB)
3. SEE OUTDOOR UNIT SCHEDULE FOR OUTDOOR AMBIENT CONDITIONS, CONNECTED CAPACITY, AND OTHER FACTORS ASSOCIATED WITH CORRECTED CAPACITIES.
4. CN24 RELAY KIT FOR BASEBOARD HEAT INTERLOCK.
5. CONDENSATE PUMP- BLUE DIAMOND MICRO BLUE W/ DUCTING KIT AND RESERVOIR SENSOR
6. PAC-YT53CRAU CONTROLLER

CONSULTANT:
VAN ZELM ENGINEERS
VAN ZELM HEYWOOD & SHADFORD, INC.
CT: 860.284.5064 MA: 617.218.9976
10 TALCOTT NOTCH, FARMINGTON, CT 06032 - 1800
Connecticut | Massachusetts | North Carolina

PROJECT NO.: 2019031.00

REVISIONS:

MARK	DATE:	DESCRIPTION

UNIVERSITY OF CONNECTICUT
ARCHITECTURAL & ENGINEERING SERVICES
31 LEDOYT ROAD UNIT 3038
STORRS, CONNECTICUT 06269-3038
TELEPHONE: (860) 486-3127
FACSIMILE: (860) 486-3177

PROJECT:
UCONN-
Fine Arts Building
Classrooms and
Practice Rooms
AC Replacement

PROJECT NO: 2019031.00
WORK ORDER NO: 901667
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AUTHOR: WPA
DRAFTER: WPA
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PRINT DATE: 11/08/2019
SHEET TITLE:
MECHANICAL SCHEDULES AND DETAILS - BLDG 'E'

SHEET:
M4.2

GENERAL ELECTRICAL NOTES

A. ALL HOMERUNS/CIRCUITS TO BE 2#12, 1#12G., 3/4"C TO A 20A-1P CIRCUIT BREAKER IN DESIGNATED PANEL, UNLESS NOTED OTHERWISE. NUMBERS SHOWN AT EACH DEVICE/HOMERUN REPRESENT CIRCUIT NUMBER IN PANELBOARD.

B. WIRE AND RACEWAY SIZES INDICATED ON HOMERUNS/CIRCUITS SHALL BE CONTINUOUS FOR ENTIRE LENGTH, UNLESS NOTED OTHERWISE.

C. ALL WIRING (CONDUITS, ETC.) TO BE CONCEALED. NO SURFACE WIRING SHALL BE INSTALLED IN FINISHED AREAS. THIS CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL CHANNELING REQUIRED OF EXISTING WALLS AND FLOORS TO ACCOMMODATE NEW WIRING. SEE PATCHING SPECIFICATIONS, FLOOR PLANS AND ELEVATIONS FOR ADDITIONAL INFORMATION ON ARCHITECTURAL AND WIRING ROUTING.

D. ALL WIRING ABOVE CEILING THAT IS NOT IN CONDUIT AND IS LOCATED IN A PLENUM SPACE SHALL BE PLENUM RATED. REFER TO MECHANICAL PLANS FOR PLENUM AREAS.

E. ELECTRICAL CONDUITS, WIRING, BOXES, ETC. SHALL NOT PENETRATE STAIR ENCLOSURE, UNLESS THEY ARE FEEDING DEVICES LOCATED WITHIN THE STAIR ENCLOSURE.

F. ALL INDIVIDUAL OR GENERAL PURPOSE BRANCH 120 VOLT CIRCUITS OVER 100'-0" IN CONDUCTOR LENGTH SHALL BE INCREASED ONE WIRE SIZE (i.e. FROM #12AWG TO #10AWG) AND CIRCUITS OVER 170'-0" IN CONDUCTOR LENGTH SHALL BE INCREASED TWO WIRE SIZES (i.e. FROM #12AWG TO #8AWG) UNLESS NOTED OTHERWISE.

G. ALL INDIVIDUAL OR GENERAL PURPOSE BRANCH 277 VOLT CIRCUITS OVER 230'-0" IN CONDUCTOR LENGTH SHALL BE INCREASED ONE WIRE SIZE (i.e. FROM #12AWG TO #10AWG) AND CIRCUITS OVER 380'-0" IN CONDUCTOR LENGTH SHALL BE INCREASED TWO WIRE SIZES (i.e. FROM #12AWG TO #8AWG,) UNLESS NOTED OTHERWISE.

H. RACEWAY AND WIRING INDICATED ON DRAWINGS ARE RECOMMENDATIONS FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. CONTRACTOR IS RESPONSIBLE FOR DETERMINING ACTUAL ROUTING.

I. ALTHOUGH ALL FEEDER AND BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SPECIFICALLY SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE FEEDER AND BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.

J. ENSURE THAT NO PIPING, DUCTWORK, LEAK PROTECTION APPARATUS OR OTHER EQUIPMENT FOREIGN TO THE ELECTRICAL TRADE PASSES THROUGH THE SPACE EQUAL TO THE WIDTH AND DEPTH OF THE ELECTRICAL DISTRIBUTION EQUIPMENT AND EXTENDING FROM THE FLOOR TO THE STRUCTURAL CEILING.

161102

GENERAL POWER NOTES

A. UNLESS OTHERWISE INDICATED, REFER TO MOTOR CIRCUIT SCHEDULE FOR ELECTRICAL REQUIREMENTS OF ALL MECHANICAL (HVAC, PLUMBING, FIRE PROTECTION, ETC.) EQUIPMENT. REFER TO DRAWINGS FOR EACH TRADE FOR EXACT LOCATION OF EQUIPMENT.

B. WHEN THE COMBINING OF CIRCUITS OR HOMERUNS IS PERMITTED ELSEWHERE IN THE CONTRACT DOCUMENTS, RACEWAYS SHALL BE LIMITED TO SIX CURRENT CARRYING CONDUCTORS (THREE PHASE AND THREE NEUTRALS) PLUS GROUNDING CONDUCTORS UNLESS OTHERWISE INDICATED. PROVIDE A DEDICATED NEUTRAL FOR EACH SINGLE PHASE CIRCUIT, UNLESS "OVERSIZED" NEUTRAL IS PROVIDED AS PART OF MANUFACTURED ASSEMBLY. IF MANUFACTURED ASSEMBLIES ARE PROVIDED WITH "OVERSIZED" NEUTRALS, PROVIDE MATCHING "OVERSIZED" NEUTRALS FROM SOURCE PANEL TO MANUFACTURED ASSEMBLY.

C. COORDINATE EXACT LOCATION OF JUNCTION BOX FOR EQUIPMENT WHICH IS FURNISHED BY OWNER OR OTHERS WITH EQUIPMENT SUPPLIER PRIOR TO CONSTRUCTION. PROVIDE WIRING FROM JUNCTION BOX TO EQUIPMENT CONNECTION AS REQUIRED.

D. WIRING INDICATED BY CIRCUIT NUMBER SYMBOL SHALL INCLUDE A NEUTRAL WHEN THE LOAD SERVED HAS PROVISIONS FOR, OR REQUIRES A NEUTRAL. TYPICALLY, ALL FEEDERS AND BRANCH CIRCUITS WILL REQUIRE A NEUTRAL, EXCEPT MOST MOTOR CIRCUITS.

160220

ABBREVIATIONS

SYMBOL	DESCRIPTION
A	AMPERE
AFF	ABOVE FINISHED FLOOR
AFI / AFCI	ARC FAULT INTERRUPTER
AHU	AIR HANDLING UNIT
C	CONDUIT
CATV	CABLE TELEVISION
C/B	CIRCUIT BREAKER
CIR	CIRCUIT
CUH	CABINET UNIT HEATER
ER	EXISTING TO REMAIN
EF	EXHAUST FAN
ELTR	EXISTING LIGHTING TO REMAIN (WITHIN SPECIFIED AREA)
EM	EMERGENCY
EMT	ELECTRIC METALLIC TUBING
EPTR	EXISTING POWER TO REMAIN (WITHIN SPECIFIED AREA)
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
F	FUSED
FA	FIRE ALARM
FLA	FULL LOAD AMPS
FMC	FLEXIBLE METALLIC CONDUIT
FUT	FUTURE
G / GND	GROUND
GFI / GFCI	GROUND FAULT INTERRUPTER
IG	ISOLATED GROUND
LFMC	LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT
MAU	MAKE-UP AIR UNIT
MCA	MINIMUM CIRCUIT AMPACITY
MD	MOTORIZED DAMPER
NC	NORMALLY CLOSED
NE	NEW LOCATION OF EXISTING RELOCATED
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NR	NEW TO REPLACE EXISTING
P	POLE (SPACE IN PANELBOARD)
PE	PRIMARY ELECTRIC SERVICE
RE	REMOVE EXISTING
REF	REFRIGERATOR
RL	RELOCATE EXISTING
RMC	RIGID METALLIC CONDUIT
RR	REMOVE AND REPLACE ON NEW SURFACE
SD	SMOKE DAMPER
ST	SHUNT STRIP
S&P	SPACE AND PROVISION
T	TELEPHONE (VOICE)
TCP	TEMPERATURE CONTROL PANEL
TV	TELEVISION
TX	TRANSFORMER
TYP	TYPICAL
UNV	UNIVERSAL
VAC	VOLTS AC
W	WIRE OR WATTS
WA OR WAP	WIRELESS ACCESS POINT
WG	WIRE GUARD
WM	SURFACE MOUNTED RACEWAY
WP	WEATHERPROOF

170608

POWER DEVICES

SYMBOL	DESCRIPTION
	ELECTRICAL PANEL 480 / 277 VOLT
	ELECTRICAL PANEL 208 / 120 VOLT
	SPECIAL-PURPOSE ELECTRICAL PANEL OR EQUIPMENT CABINET
Tx	ELECTRICAL POWER TRANSFORMER
F	FUSED DISCONNECT SWITCH
	ELECTRIC MOTOR
VFD	VARIABLE FREQUENCY DRIVE
J	JUNCTION BOX
	HARD-WIRED EQUIPMENT CONNECTION
JFC	FAN COIL UNIT POWER CONNECTION BOX
ST	MANUAL STARTER WITH THERMAL OVERLOAD PROTECTION
a	DUPLEX RECEPTACLE; COORDINATE LOCATION WITH ARCHITECT

180906

WIRING

SYMBOL	DESCRIPTION
	BRANCH CIRCUIT WIRING
	BRANCH CIRCUIT SWITCHED WIRING
	CONDUIT UP
	CONDUIT DOWN
	WIRE BREAK
	POINT OF CONNECTION / WIRE TAP
OR	HOME RUN. 3/4" CONDUIT, 2#12 AND 1#12 GROUND, UNLESS OTHERWISE NOTED. NOTE: HOME RUN SHALL BE FROM FIRST ELECTRICAL DEVICE BACKBOX IN CIRCUIT TO ELECTRICAL PANEL

150916

LEGEND NOTE

THESE LEGENDS AND ABBREVIATIONS DEFINE ITEMS INDICATED ON DRAWINGS. NOT ALL SYMBOLS OR ABBREVIATIONS DEFINED ARE NECESSARILY USED ON THIS PROJECT.

150918

CONSULTANT:

VANZELM ENGINEERS

VAN ZELM HEYWOOD & SHADFORD, INC.

CT: 860.284.5064 MA: 617.218.9976

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31 LEDOYT ROAD UNIT 3038

STORRS, CONNECTICUT 06269-3038

TELEPHONE: (860) 486-3127

FACSIMILE: (860) 486-3177

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UCONN-
Fine Arts Building
Classrooms and
Practice Rooms
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PROJECT NO: 2019031.00

WORK ORDER NO: 901667

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GENERAL NOTES

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SHEET: 8 of 12

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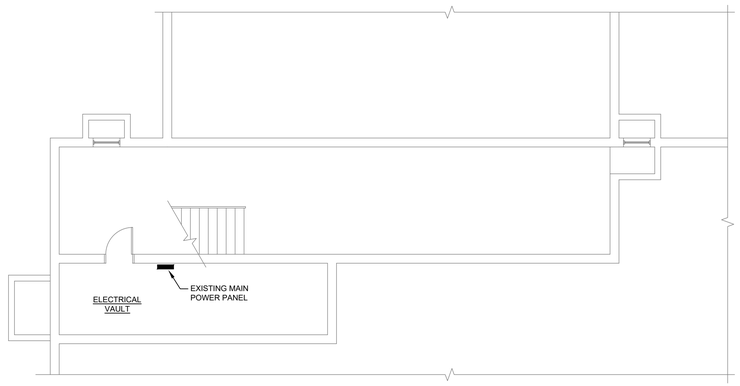
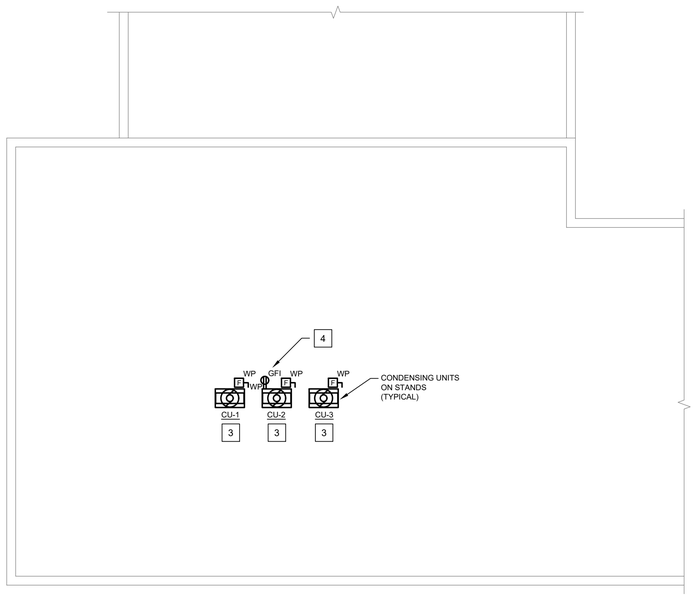
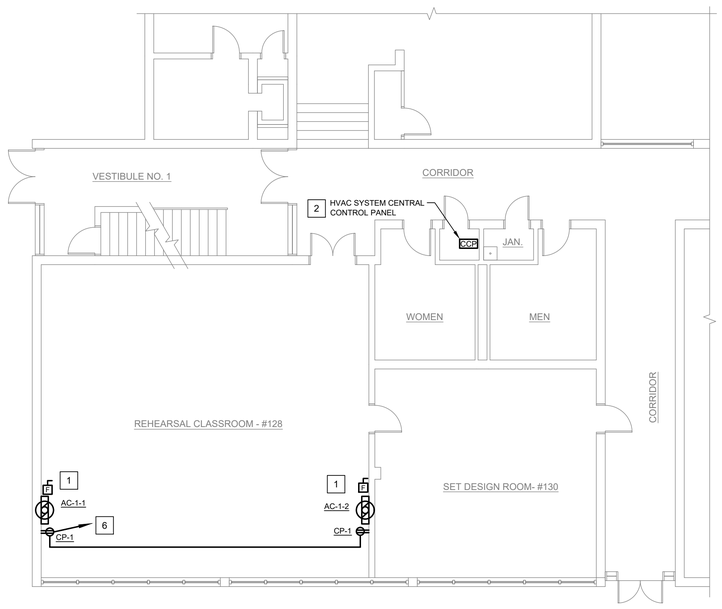


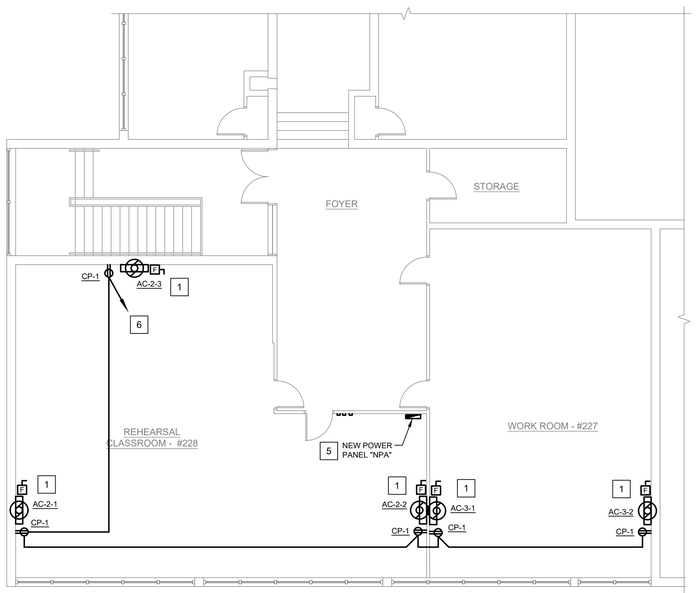
1 ELECTRICAL NEW WORK BASEMENT PART PLAN - BUILDING 'C'
SCALE: 1/8" = 1'-0"



4 ELECTRICAL NEW WORK ROOF PART PLAN - BUILDING 'C'
SCALE: 1/8" = 1'-0"



2 ELECTRICAL NEW WORK FIRST FLOOR PART PLAN - BUILDING 'C'
SCALE: 1/8" = 1'-0"



3 ELECTRICAL NEW WORK SECOND FLOOR PART PLAN - BUILDING 'C'
SCALE: 1/8" = 1'-0"

POWER PLAN KEY NOTES

1. PROVIDE BRANCH POWER CIRCUIT CONNECTION TO NEW A/C UNIT AS SHOWN, REFER TO "MOTOR CIRCUIT SCHEDULE" ON DRAWING #E4.1 FOR ADDITIONAL INFORMATION.
2. PROVIDE NEW BRANCH CIRCUIT, 2#12, 1#12G., 3/4"C. TO AN EXISTING 20A/1P CIRCUIT BREAKER IN EXISTING LOCAL POWER PANEL FOR NEW HVAC CENTRAL CONTROL PANEL, MAKE FINAL CONNECTIONS TO PANEL PER MANUFACTURER'S WIRING DIAGRAMS.
3. PROVIDE BRANCH POWER CIRCUIT CONNECTION TO NEW A/C UNIT CONDENSING UNIT AS SHOWN, REFER TO "MOTOR CIRCUIT SCHEDULE" ON DRAWING #E4.1 FOR ADDITIONAL INFORMATION.
4. PROVIDE NEW BRANCH CIRCUIT, 2#12, 1#12G., 3/4"C. TO AN EXISTING 20A/1P CIRCUIT BREAKER IN EXISTING LOCAL POWER PANEL FOR NEW ROOF MOUNTED WORK RECEPTACLE LOCATED AT NEW HVAC CONDENSING UNITS.
5. PROVIDE NEW POWER PANEL "NPA", REFER TO "PARTIAL POWER RISER DIAGRAM" ON DRAWING #E4.1 FOR ADDITIONAL INFORMATION.
6. PROVIDE NEW BRANCH CIRCUIT, 2#12, 1#12G., 3/4"C. TO AN EXISTING 20A/1P CIRCUIT BREAKER IN EXISTING LOCAL POWER PANEL FOR NEW CONDENSATE PUMP UNIT RECEPTACLE. MOUNT RECEPTACLE ADJACENT TO PUMP.

GENERAL NOTES

A. REFER TO DRAWING #E0.1 FOR ELECTRICAL SYMBOL LISTS, ABBREVIATIONS AND GENERAL NOTES.

B. SEAL ALL INTERIOR WALL CONDUIT PENETRATIONS TO REDUCE SOUND TRANSMISSION AND FIRESTOP PENETRATIONS THROUGH RATED WALLS.

PLAN NORTH

CONSULTANT:
VANZELM ENGINEERS
VAN ZELM HEYWOOD & SHADFORD, INC.
CT: 860.284.5064 MA: 617.218.9976
10 TALCOTT NOTCH, FARMINGTON, CT 06032 - 1800
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ARCHITECTURAL & ENGINEERING SERVICES
31 LEDOYT ROAD UNIT 3038
STORRS, CONNECTICUT 06269-3038
TELEPHONE: (860) 486-3127
FACSIMILE: (860) 486-3177

PROJECT:
UCONN-
Fine Arts Building
Classrooms and
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AC Replacement

KEYPLAN

PROJECT NO:	2019031.00
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ELECTRICAL
NEW WORK
PART PLANS -
BUILDING 'C'

SHEET:
E1.0

SHEET: 9 of 12

File Name:E101-FL01.dwg
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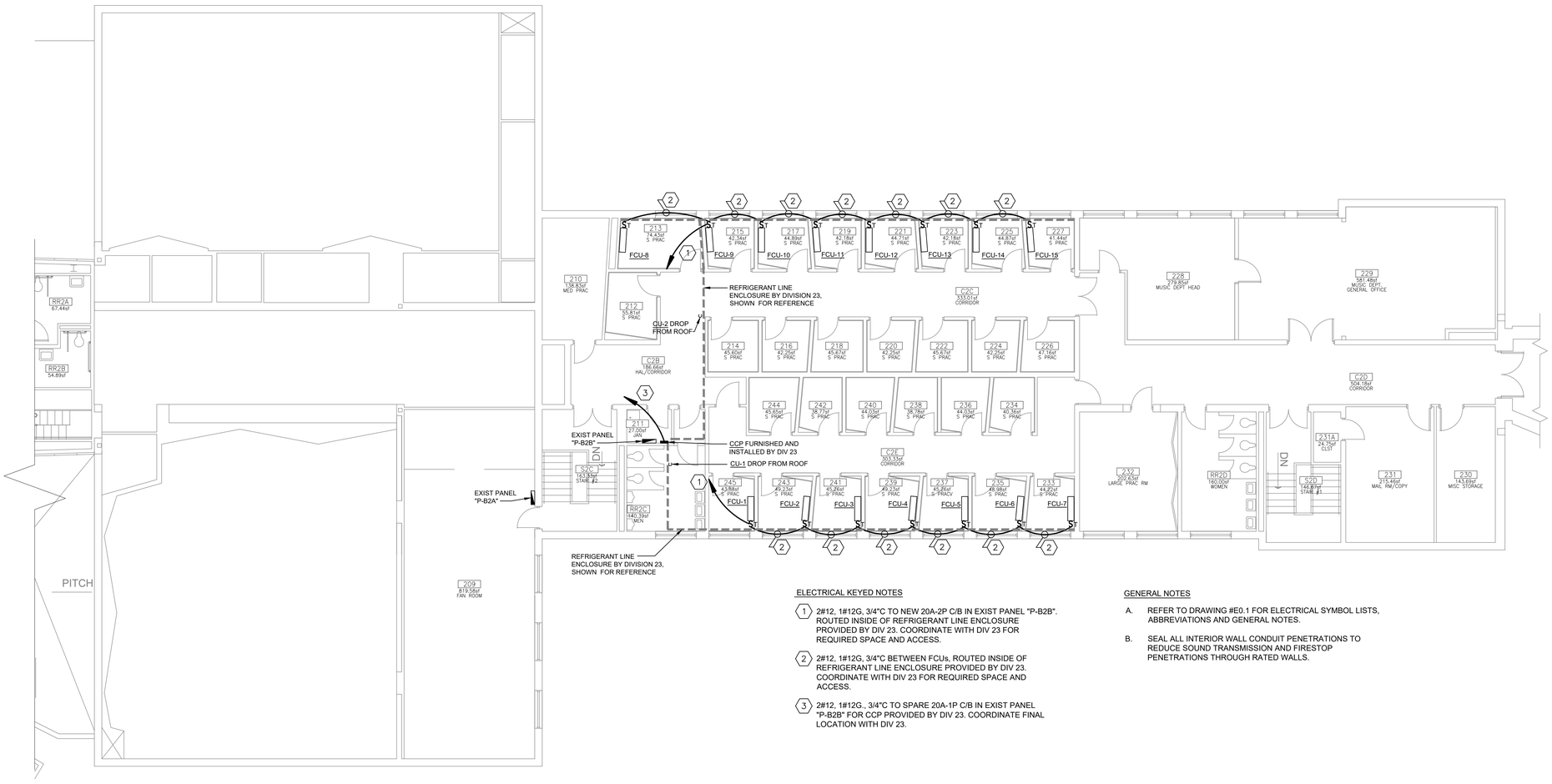

1 ELECTRICAL NEW WORK SECOND FLOOR PLAN - BUILDING 'E'
SCALE: 1/8" = 1'-0"

ELECTRICAL KEYED NOTES

1. 2#12, 1#12G, 3/4"C TO NEW 20A-2P C/B IN EXIST PANEL "P-B2B". ROUTED INSIDE OF REFRIGERANT LINE ENCLOSURE PROVIDED BY DIV 23. COORDINATE WITH DIV 23 FOR REQUIRED SPACE AND ACCESS.
2. 2#12, 1#12G, 3/4"C BETWEEN FCUs, ROUTED INSIDE OF REFRIGERANT LINE ENCLOSURE PROVIDED BY DIV 23. COORDINATE WITH DIV 23 FOR REQUIRED SPACE AND ACCESS.
3. 2#12, 1#12G., 3/4"C TO SPARE 20A-1P C/B IN EXIST PANEL "P-B2B" FOR CCP PROVIDED BY DIV 23. COORDINATE FINAL LOCATION WITH DIV 23.

GENERAL NOTES

A. REFER TO DRAWING #E0.1 FOR ELECTRICAL SYMBOL LISTS, ABBREVIATIONS AND GENERAL NOTES.

B. SEAL ALL INTERIOR WALL CONDUIT PENETRATIONS TO REDUCE SOUND TRANSMISSION AND FIRESTOP PENETRATIONS THROUGH RATED WALLS.

PANELBOARD SCHEDULE - BUILDING E

PANEL	LOCATION	PANEL DESCRIPTION					BRANCH CIRCUIT BREAKER		REMARKS
		MAINS	VOLTAGE	POLES	MT'G	A.I.C.	ACTIVE	SPARE	
EXISTING "P-B2B"	JAN CLOSET 211	225A-3P	120/208V-3Ø-4W	42	SURFACE	10K AIC	(19) 20A-1P (2) 20A-2P (NEW) (2) 40A-2P (NEW)	(15) 20A-1P	1. REMOVE (8) SPARE 20A-1P C/Bs TO MAKE SPACE FOR NEW BREAKERS FEEDING NEW MECHANICAL EQUIPMENT. 2. INSTALL NEW BREAKERS SUCH THAT PANEL LOAD WILL BE BALANCED IN AS MUCH AS POSSIBLE. 3. TURN REMOVED BREAKERS OVER TO OWNER.

PLAN NORTH

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CT: 860.284.5064 MA: 617.218.9976
10 TALCOTT NOTCH, FARMINGTON, CT 06032 - 1800
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FACSIMILE: (860) 486-3177

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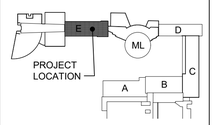

KEYPLAN

PROJECT NO:	2019031.00
WORK ORDER NO:	901667
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NEW WORK
SECOND FLOOR PLAN -
BUILDING 'E'

SHEET:
E2.0

SHEET: 10 of 12

File Name: E101-FL01.dwg
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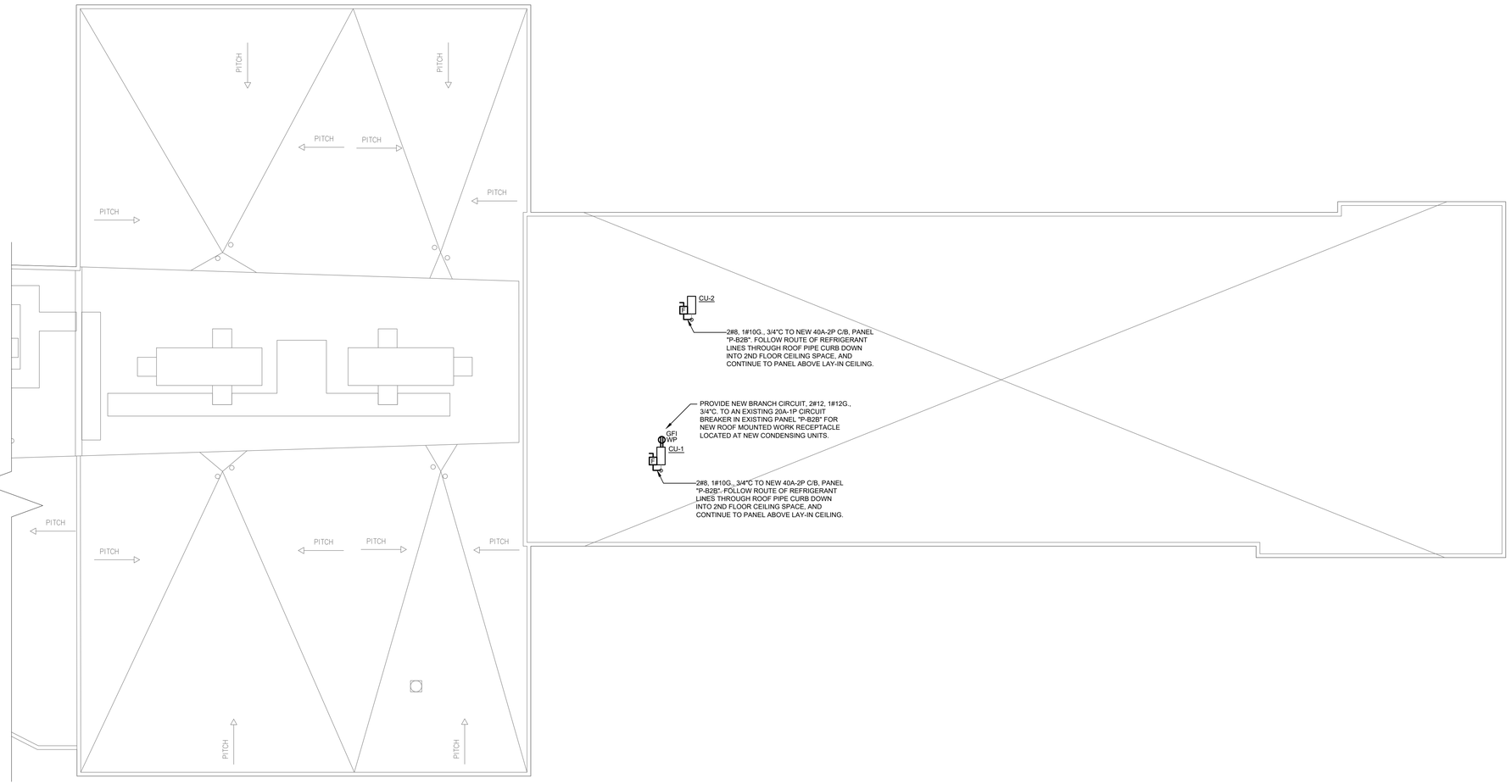

1 ELECTRICAL NEW WORK ROOF PLAN - BUILDING 'E'
SCALE: 1/8" = 1'-0"

PLAN NORTH

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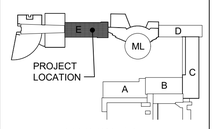

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NEW WORK
ROOF PLAN -
BUILDING 'E'

SHEET:
E3.0

SHEET: 11 of 12

File Name:E101-FL01.dwg
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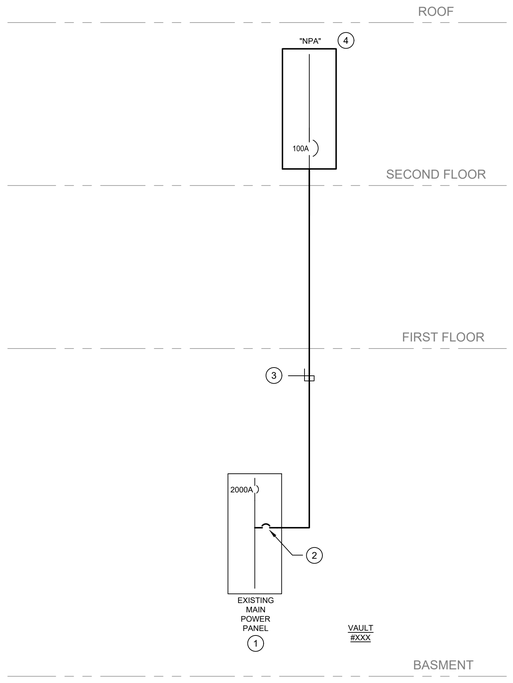

1 PARTIAL ELECTRICAL RISER DIAGRAM

SCALE: NOT TO SCALE

ELECTRICAL RISER DIAGRAM GENERAL NOTES:

A. ALL CIRCUIT BREAKERS SHOWN ARE 3-POLE UNLESS NOTED OTHERWISE.

B. REFER TO PANELBOARD SCHEDULE ON THIS DRAWING FOR ADDITIONAL INFORMATION.

RISER DIAGRAM KEY NOTES

1. EXISTING ELECTRICAL EQUIPMENT TO REMAIN.
2. PROVIDE A NEW 150A, 3P, 208V CIRCUIT BREAKER AT AVAILABLE SPACE IN EXISTING MAIN POWER PANEL FOR NEW FEEDER TO NEW PANEL "NPA".
3. PROVIDE NEW FEEDER FROM NEW CIRCUIT BREAKER IN EXISTING MAIN PANEL AND EXTEND UP TO NEW PANEL "NPA" ON SECOND FLOOR. NEW FEEDER WIRING SHALL BE, 4 #1/0, 1 #6 G., IN 2" C.
4. PROVIDE NEW 120/208V, 3PH, 4W. PANEL "NPA", REFER TO PANEL SCHEDULE ON THIS DRAWING FOR ADDITIONAL INFORMATION.

MOTOR CIRCUIT SCHEDULE

EQUIPMENT	LOCATION	CIRCUIT / SOURCE PANEL	O.C.P. DEVICE	FEEDER	LOCAL DISC. SWITCH	MOTOR STARTER TYPE	MOTOR STARTER SIZE	MOTOR STARTER LOCATION	LOAD KW	LOAD HP	LOAD PH	LOAD VOLT	REMARKS
CP-1	AT AC UNITS		20A-1P	2#12, 1#12G, 3/4"C	THERM SWITCH	W / EQ	---	AT UNIT	---	---	1	120	NOTE #2
AC-1-1	REHEAR. CLASSRM. #128	POWERED BY CU-1	NOTE #7	2#12, 1#12G, 3/4"C	THERM SWITCH	W / EQ	---	AT UNIT	---	---	1	120	NOTES #5, 7
AC-1-2	REHEAR. CLASSRM. #128	POWERED BY CU-1	NOTE #7	2#12, 1#12G, 3/4"C	THERM SWITCH	W / EQ	---	AT UNIT	---	---	1	120	NOTES #5, 7
AC-2-1	REHEAR. CLASSRM. #228	POWERED BY CU-2	NOTE #7	2#12, 1#12G, 3/4"C	THERM SWITCH	W / EQ	---	AT UNIT	---	---	1	120	NOTES #5, 7
AC-2-2	REHEAR. CLASSRM. #228	POWERED BY CU-2	NOTE #7	2#12, 1#12G, 3/4"C	THERM SWITCH	W / EQ	---	AT UNIT	---	---	1	120	NOTES #5, 7
AC-2-3	REHEAR. CLASSRM. #228	POWERED BY CU-2	NOTE #7	2#12, 1#12G, 3/4"C	THERM SWITCH	W / EQ	---	AT UNIT	---	---	1	120	NOTES #5, 7
AC-3-1	WORK ROOM #227	POWERED BY CU-3	NOTE #7	2#12, 1#12G, 3/4"C	THERM SWITCH	W / EQ	---	AT UNIT	---	---	1	120	NOTES #5, 7
AC-3-2	WORK ROOM #227	POWERED BY CU-3	NOTE #7	2#12, 1#12G, 3/4"C	THERM SWITCH	W / EQ	---	AT UNIT	---	---	1	120	NOTES #5, 7
CU-1	ROOF	2,4,NPA	40A-2P	2#8, 1#10G, 3/4"C	60A/40A WP	---	---	---	---	---	1	208	NOTES #5, 7
CU-2	ROOF	5,7,NPA	40A-2P	2#8, 1#10G, 3/4"C	60A/40A WP	---	---	---	---	---	1	208	NOTES #5, 7
CU-3	ROOF	1,3,NPA	25A-2P	2#10, 1#10G, 3/4"C	30A/25A WP	---	---	---	---	---	1	208	NOTES #5, 7

MOTOR CIRCUIT SCHEDULE REFERENCED NOTES:

1. REFER TO PANELBOARD SCHEDULE FOR ADDITIONAL SOURCE PANEL INFORMATION.
2. REFER TO FLOOR PLANS FOR ADDITIONAL SOURCE PANEL INFORMATION.
3. VFD FURNISHED AND INSTALLED BY DIVISION 23. POWER WIRING FROM SOURCE TO VFD BY DIVISION 26. POWER WIRING BETWEEN VFD AND MOTORS BY DIVISION 26. CONTROL WIRING BY DIVISION 23.
4. VFD FURNISHED BY DIVISION 23 AND INSTALLED BY DIVISION 26. POWER WIRING FROM SOURCE TO VFD BY DIVISION 26. POWER WIRING BETWEEN VFD AND MOTORS BY DIVISION 26. CONTROL WIRING BY DIVISION 23.
5. STARTER/CONTROLLER IS PRE-WIRED TO MOTORS AND FURNISHED BY DIVISION 23.
6. LOCAL FUSED DISCONNECT SWITCH FURNISHED BY DIVISION 23 AS AN INTEGRAL COMPONENT OF THE EQUIPMENT.
7. THE INDOOR AND OUTDOOR COMPONENTS OF "SPLIT" SYSTEM AIR CONDITIONING UNITS SHARE A POWER CIRCUIT. EXTEND POWER BRANCH CIRCUIT FROM DESIGNATED POWER PANEL TO ROOF MOUNTED CONDENSING UNIT. FROM CONDENSING UNIT EXTEND BRANCH CIRCUIT WIRING TO ASSOCIATED INDOOR A/C UNIT(S). REFER TO MECHANICAL EQUIPMENT SCHEDULES AND MANUFACTURER'S WIRING DIAGRAMS FOR ADDITIONAL INFORMATION.

MOTOR CIRCUIT SCHEDULE GENERAL NOTES:

A. REFER TO SPECIFICATIONS FOR STANDARD FEATURES.

B. ABBREVIATIONS:

VFD - VARIABLE FREQUENCY DRIVE
FVNR - FULL VOLTAGE, NON-REVERSING
FHMS - FRACTIONAL HORSEPOWER MOTOR STARTER
MAN - MANUAL STARTER (TOGGLE SWITCH WITH THERMAL OVERLOADS)

C. O.C.P. DEVICES AND LOCAL DISC. SWITCHES ARE THREE POLE UNLESS OTHERWISE NOTED.

D. LOCAL DISCONNECT SWITCH SIZE INDICATES SWITCH FRAME FOLLOWED BY FUSE SIZE (i.e. 30A/20A REPRESENTS 30A FRAME SWITCH WITH 20A FUSES).

E. PROVIDE WEATHERPROOF FUSED DISCONNECT SWITCHES WHERE LOCATED OUTSIDE OR IN WET LOCATIONS.

F. STARTERS, DISCONNECT SWITCHES, CIRCUIT BREAKERS, BRANCH CIRCUIT WIRING, ETC. INDICATED IN THE MOTOR CIRCUIT SCHEDULE SHALL BE FURNISHED AND INSTALLED BY DIVISION 26 UNLESS OTHERWISE NOTED.

G. THE "O.C.P. DEVICE" SHALL BE A CIRCUIT BREAKER UNLESS OTHERWISE NOTED.

PANELBOARD SCHEDULE

PANEL	LOCATION	PANEL DESCRIPTION MAINS	VOLTAGE	POLES	MT'G	A.I.C.	DESCRIPTION ACTIVE	DESCRIPTION SPARE	REMARKS
EXISTING MAIN POWER PANEL	BASEMENT ELECTRICAL VAULT	2000A MCB	120/208 3Ø, 4W	42	SURF.	EXIST.	(1) 100A-3P		PROVIDE NEW CIRCUIT BREAKERS AS SHOWN.
"NPA" NEW GENERAL USE POWER PANEL	2ND FLOOR REHEARSAL CLASSROOM #228	150A MCB	120/208 3Ø, 4W	42	SURF.	22K	(10) 20A-1P		
							(1) 25A-2P		
							(2) 40A-2P		

PANEL SCHEDULE GENERAL NOTES:

1. ALL EXISTING PANELS WITHIN PROJECT SCOPE AREA ARE TO REMAIN IN PLACE AND OPERATIONAL.
2. ONLY EXISTING PANELS THAT ARE TO HAVE NEW CIRCUIT BREAKERS ADDED OR HAVE NEW ELECTRICAL LOADS CONNECTED TO EXISTING CIRCUIT BREAKERS HAVE BEEN SHOWN ON THIS SCHEDULE.
3. THE EXISTING MAIN POWER PANEL IS A 120/208V, 3PHASE, 4W SQUARE D MODEL "XXXX" SERIES PANEL.
4. AT THE COMPLETION OF THIS PROJECT WORK, UPDATE THE BRANCH CIRCUIT DIRECTORIES FOR ALL EXISTING PANELS AFFECTED BY NEW CONSTRUCTION.

CONSULTANT:
VANZELM ENGINEERS
VAN ZELM HEYWOOD & SHADFORD, INC.
CT: 860.284.5064 MA: 617.218.9976
10 TALCOTT NOTCH, FARMINGTON, CT 06032 - 1800
Connecticut | Massachusetts | North Carolina

PROJECT NO.: 2019031.00

REVISIONS:

MARK	DATE:	DESCRIPTION:

UNIVERSITY OF CONNECTICUT
ARCHITECTURAL & ENGINEERING SERVICES
31 LEDOYT ROAD UNIT 3038
STORRS, CONNECTICUT 06269-3038
TELEPHONE: (860) 486-3127
FACSIMILE: (860) 486-3177

PROJECT:
UCONN-
Fine Arts Building
Classrooms and
Practice Rooms
AC Replacement

PROJECT NO: 2019031.00
WORK ORDER NO: 901667
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DRAFTER: RLG
SCALE: AS NOTED
PRINT DATE: 11/08/2019
SHEET TITLE:
ELECTRICAL DETAIL AND SCHEDULES
SHEET:
E4.1
SHEET: 12 of 12

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