

CONTRACT BIDDING DOCUMENTS

FOR

**AIR HANDLING UNIT REPLACEMENT AT
SEDGWICK MIDDLE SCHOOL
128 SEDGWICK RD
WEST HARTFORD, CT 06108**

BID # 210001



INFORMATION
AIR HANDLING UNIT REPLACEMENT AT
SEDGWICK MIDDLE SCHOOL
128 SEDGWICK ROAD
West Hartford, CT 06107
BID#210001

ARCHITECT
LUCIAN DRAGULSKI, PE
BEMIS ASSOCIATES LLC
185 MAIN STREET
FARMINGTON, CT 06032

PROJECT MANAGER
MICHAEL R. LONGO,
FACILITIES MANAGER

ALL QUESTIONS TO
PURCHASING SERVICES
TAMMY BRADLEY
SR. BUYER

All questions must be submitted in writing and emailed to tammyb@westhartfordCT.gov, at least seven calendar days prior to the date established for the opening of bids. Please do not call the Engineer/ Architect, Project Manager or Purchasing Office with questions.

INSTRUCTIONS TO BIDDERS

- 00101 PROJECT INFORMATION PAGE
- 00102 TABLE OF CONTENTS
- 00103 PROJECT NARRATIVE
- 00104 LIST OF DRAWINGS
- 00105 LOCATION MAP
- 00106 WORK RULES
- 00107 NOISE ORDINANCE
- 00108 VENDOR REGISTRATION

BIDDING REQUIREMENTS AND FORMS

- 00201 INVITATION TO BID
- 00202 INSTRUCTIONS TO BIDDERS - AIA DOCUMENT A701-1997
- 00203 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS
- 00204 BID FORMS

LABOR REQUIREMENTS

- 00303 CONTRACT LABOR RATES

GENERAL CONDITIONS

- 00401 GENERAL CONDITIONS - AIA DOCUMENT A201-2007
- 00402 SUPPLEMENTARY GENERAL CONDITIONS

DIVISION 23 – MECHANICAL

- 20 00 50 GENERAL CONDITIONS FOR MECHANICAL AND ELECTRICAL SYSTEMS
- 23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC
- 23 07 00 HVAC INSULATION
- 23 09 13 INSTRUMENTATION AND CONTROLS FOR HVAC
- 23 21 13 HYDRONIC PIPING
- 23 31 13 METAL DUCTS
- 23 63 13 AIR COOLED CONDENSING UNIT
- 23 73 13 CUSTOM AIR HANDLING UNITS

DIVISION 26 – ELECTRICAL

- 26 00 00 GENERAL ELECTRICAL
- 26 05 00 BASIC ELECTRICAL MATERIALS & METHODS

PROJECT NARRATIVE

The Town of West Hartford is seeking a qualified contractor to do remove an air handling unit and install a new air handling unit as indicated in the engineer's documents. This project will be located at Sedgwick Middle School, 128 Sedgwick Rd, West Hartford. Work must be coordinated with the occupants as not to interfere with their normal business routine. The work area must be kept cleaned and free of hazards at all times.

The Scope of Work

- See Attached Engineers Drawings and Bid Document Package
- It is anticipated the construction will take place in areas not occupied by students while school is in session. There will be no disruptions to the school and any work requiring a potential disruption will be scheduled off hours.

Any areas disturbed by construction shall be repaired and painted to match existing conditions.

All work must conform to all Federal, State and Local codes.

Mechanical Permits will be the responsibility of the contractor. Fee is waived.

LIST OF DRAWINGS

COVER

S1.1	DUNNAGE FRAMING PLAN AND DETAILS
ME0.1	MECHANICAL/ ELECTRICAL GENERAL NOTES AND SYMBOLS
MED1.1	MECHANICAL/ ELECTRICAL DEMOLITION WORK- GROUND FLOOR
MED1.2	MECHANICAL/ ELECTRICAL DEMOLITION WORK- FIRST FLOOR
MED1.3	MECHANICAL/ ELECTRICAL DEMOLITION WORK- SECOND FLOOR
ME1.1	MECHANICAL/ ELECTRICAL NEW WORK- GROUND FLOOR
ME1.2	MECHANICAL/ ELECTRICAL NEW WORK- FIRST FLOOR
ME1.3	MECHANICAL/ ELECTRICAL NEW WORK- SECOND FLOOR
M2.0	MECHANICAL SCHEDULES
M3.0	MECHANICAL DETAILS

END OF LIST OF DRAWINGS

Notes



General

1. Contractor, Supervisory, and Trades personnel will be required to be familiar with and adhere to the Project Work Rules. Failure to comply with the Work Rules may result in being banned from the project site.
2. The Contractor shall take direction only from the Capital Project Manager or their representative.
3. All construction activities that are disruptive to school operations (due to noise, vibration, dust, orders, etc.) shall occur outside regular school instructional hours.
4. Contractors shall not use Town-owned dumpsters for refuse disposal unless given prior written permission from the Town's capital projects manager.
5. No entry into the building is allowed without prior permission of the Town. When entry is granted each individual must sign in at the main office and obtain a visitor's badge.
6. Have staff available on site to receive and upload your materials whenever deliveries are made. If Contractor staff is not available the delivery will be refused.
7. The Contractor shall maintain, at the site, one copy of the drawings, specifications, addenda, change orders and other modifications, in good order and marked currently; and one copy of approved shop drawings, product data, samples and similar required submittals.
8. Maintain complete files of Material Safety Data Sheets (MSDS) on the jobsite.
9. The Owner does not provide secure storage for the Contractor's materials and tools.

Foreman/Supervisory Personnel

1. The Trade Foreman/Superintendent must be on the jobsite whenever their staff is on site. This includes subcontractor personnel.

All Contractor Personnel

1. Contractors, subcontractors, and all their personnel shall wear a uniform with the company's logo while on site.
2. For individuals working in school buildings or on school sites, the Contractors must conduct a criminal background check. Prior to working in any school building, the Contractor shall provide verification that their employees and subcontractors do not appear on any Sex Offender Registry.
3. Job hours are 7:00 AM to 3:30 PM for first shift and 3:30 PM to 11:00 PM for second shift. Additional time may be subject to custodial overtime charges of approximately \$40.00 per hour.

4. Materials deliveries or movement of construction vehicles is not permitted among buses and students during drop-off or pickup times 8:00-8:45 AM & 3:15-3:45 PM Monday, Tuesday, Thursday, Friday and 1:45-2:15 PM on Wednesday. Times vary among elementary, middle and high school and will be confirmed with the Contractor.
5. No alcohol or controlled substances are allowed on the school property.
6. No smoking is allowed within the building or on the school property.
7. No food is to be eaten in the building. All food-related trash is to be removed from the site at the end of each day.
8. Use of radios and other amplified sound systems is disruptive to building occupants and is not permitted during classroom instructional hours.
9. Clean up all work areas daily. Keep the job clean and debris free.
10. Coordinate your work with the work of other trades. Check preceding work prior to starting new work. Do not proceed unless preceding work is completely acceptable.
11. Protect your work at all times from damage.
12. Park in designated areas only. Keep parking areas accessible for emergency vehicles. Privately owned vehicles are not permitted in areas of construction.
13. Passenger elevators are not to be used by Contractors for transporting materials.

Safety

1. All work activities are to be planned with Safety as the #1 priority.
2. A copy of the Contractor's safety program shall be present at job site.
3. A first aid kit appropriate to the size of the work crew is to be provided by the Contractor
4. Appropriate fire extinguishing supplied by the Contractor shall be present at the work area.
5. All personnel in work areas will have, at a minimum, hard hats, safety glasses, work shoes, shirts with sleeves, and long pants. Hard hats have to have company and employees name.
6. No interruption of building services (e.g. power, water, fire alarm intercom, ventilation, heating, cooling, etc.) without prior coordination with, and permission from, the Owner.
7. No use of any tools, equipment or supplies, other than those supplied by the Contractor.

§ 123-2

NOISE

- L.** Noise created as a result of or relating to an emergency.
- M.** Noise generated by construction activity shall be exempted between the hours of 7:00 a.m. to one hour after sundown, Monday through Saturday.
- N.** Noise created by blasting other than that conducted in connection with construction activities shall be exempted, provided that the blasting is conducted between 8:00 a.m. and 5:00 p.m. local time at specified hours previously announced to the local public or provided that a permit for such blasting has been obtained from local authorities.
- O.** Noise created by on-site recreational or sporting activity which is sanctioned by the state or local government, provided that noise discharged from exhausts is adequately muffled to prevent loud and/or explosive noises therefrom.
- P.** Patriotic or public celebrations not extending longer than one calendar day.
- Q.** Noise created by aircraft.
- R.** Noise created by products undergoing test, where one of the primary purposes of the test is the evaluation of product noise characteristics and where practical noise control measures have been taken.
- S.** Noise generated by transmission facilities, distribution facilities and substations of public utilities providing electrical powers, telephone, cable television or other similar services and located on property which is not owned by the public utility and which may or may not be within utility easements.

INVITATION TO BID

Sealed Bid Submissions marked “AIR HANDLING UNIT REPLACEMENT AT SEDGWICK MIDDLE SCHOOL BID #210001” will be received at the office of the Purchasing Division, Room 223, Town Hall, 50 South Main Street, West Hartford, Connecticut until 2:00 PM on August 11, 2020 at which time they will be publicly* opened and read.

Plans and specifications are available for downloading at www.westhartfordct.gov/bids. Any questions concerning this request for bid shall be addressed to the Purchasing Agent at the address above.

A pre-bid conference will be held on July 28, 2020 at 10:00 AM at Sedgwick Middle School, 128 Sedgwick Road, West Hartford, CT at which time questions concerning the project will be answered. Prospective bidders are expected to attend the pre-bid meeting as this will be the only opportunity to verbalize questions relative to this project and view the job site with the Town's project team. We will follow COVID19 social distancing regulations.

All Bidders must file with their bid a bid bond, certified or treasurer's check in the amount of 10% of the total of the base bid made payable to the Town of West Hartford.

Performance and Labor and Material Payment bonds in the amount of 100% of the contract price will be required of the successful bidder if the contract pursuant to this request for bids exceeds \$50,000.00.

No bid may be withdrawn for a period of ninety (90) days after the opening of bids without the approval and written consent of the Town of West Hartford.

The right is reserved to reject any and all bids, to waive any informalities in the bidding and to make awards in any manner that is the most beneficial to the Town.

*Bidders are encouraged to attend the Town's bid opening at which time the public is afforded an opportunity to record bid prices received in response to the Town's solicitation. Bidders who would like the results of the bid but are unable to attend the bid opening, may check the Town website, www.westhartfordct.gov/gov/departments/purchasing/bid_results a week after the bid opening date. Bidders calling the Purchasing Office for bid results will be referred to the above procedure.

*Due to COVID19, the Town Hall has restricted entry. For this bid, we are allowing for electronic submission along with hard copy submission. All participants must submit both. Hard copy must match electronic submission, the Town maintains the right to reject any bid that does not meet this criteria. Hard copies are to be received in the purchasing office no later than *12:00 noon on August 14, 2020*. They can be mailed or delivered. If delivered, the Town Hall has a number posted at its entry to call for receipt.

Electronic submissions are still required by *August 11, 2020 at 2:00 PM*. In order to provide an electronic submission you must be registered in our vendor database. Please see the vendor registration instructions. Once registered, you will gain access to the bid and the bid documents. Please follow the prompts when submitting your price structures. If you have questions regarding electronic submission, please do not hesitate to contact Tammy Bradley via email at tammyb@westhartfordct.gov.

TOWN OF WEST HARTFORD
PETER PRIVITERA
PURCHASING AGENT

AIA® Document A701™ – 2018

Instructions to Bidders

for the following Project:

(Name, location, and detailed description)

Air Handling Unit Replacement at Sedgwick Middle School Bid# 210001
128 Sedgwick Road
West Hartford, CT

THE OWNER:

(Name, legal status, address, and other information)

Town of West Hartford
50 South Main Street
West Hartford, CT 06107

THE ARCHITECT:

(Name, legal status, address, and other information)

Lucian Dragulski, PE
Bemis Associates LLC
185 Main Street
Farmington, CT 06032

TABLE OF ARTICLES

- | | |
|----------|---|
| 1 | DEFINITIONS |
| 2 | BIDDER'S REPRESENTATIONS |
| 3 | BIDDING DOCUMENTS |
| 4 | BIDDING PROCEDURES |
| 5 | CONSIDERATION OF BIDS |
| 6 | POST-BID INFORMATION |
| 7 | PERFORMANCE BOND AND PAYMENT BOND |
| 8 | ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS |

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.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.
(Indicate how, such as by email, website, host site platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

(Insert the form and amount of bid security.)

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013.)

- .5 Drawings

- | Number | Title | Date | |
|--------|--|--------------|------------------------|
| .6 | Specifications | | |
| | Section | Title | Date Pages |
| .7 | Addenda: | | |
| | Number | Date | Pages |
| .8 | Other Exhibits: | | |
| | <i>(Check all boxes that apply and include appropriate information identifying the exhibit where required.)</i> | | |
| | [] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
<i>(Insert the date of the E204-2017.)</i> | | |
| | [] The Sustainability Plan: | | |
| | Title | Date | Pages |
| | [] Supplementary and other Conditions of the Contract: | | |
| | Document | Title | Date Pages |
| .9 | Other documents listed below: | | |
| | <i>(List here any additional documents that are intended to form part of the Proposed Contract Documents.)</i> | | |

INSTRUCTIONS TO BIDDERS

AIA Document A701, "Instructions to Bidders", 1997 Edition, American Institute of Architects, Articles 1 through 8, are bound herein and are hereby made a part of the Contract Documents, and shall apply to all Contractors and Subcontractors.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

Certain Articles of the AIA Instructions to Bidders are revised or replaced by requirements of the Supplementary Instructions, listed below. Such revisions are replacements and shall take precedence over the AIA Instructions to Bidders.

The Following Articles, revised paragraphs, and clauses have the same numerical designations occurring in the AIA Instructions to Bidders, and all additions follow in direct numbered sequence.

Article 1 - Definition

1.3 Delete paragraph 1.3 in its' entirety and substitute the following: Addenda are written or graphic instruments issued by the Architect and distributed by the Owner prior to the bid opening which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

Article 2 - Bidder's Representation

Add the following as paragraphs 2.2 and 2.3

2.2 A pre-bid conference may be held prior to bidding, at which time all interested parties are requested to attend. The intent of the project and Bidding Documents will be discussed. There will be a question and answer period, during which time prospective bidders are invited to request clarification or interpretation of any and all parts of the Bidding Documents. See Invitation to Bid for date, time, and location of Conference.

2.3 Guided tours of the Project Site, at the discretion of the owner, may be conducted prior to the pre-bid conference. Questions and or requests for clarification will not be addressed while the tour is being conducted.

ARTICLE 3 - BIDDING DOCUMENTS

3.1.1: Delete second sentence and substitute with the following:

Refer to instructions on Invitation to Bid Page 00201-1.

3.1.2: Delete Paragraph 3.1.2.

3.2.2: Delete the word "Architect" and substitute the word "Owner".

3.3.4: Delete paragraph 3.3.4 in its entirety and substitute with the following:

After the award of the Contract, no substitutions will be considered for the brands specified, except upon written request of the Contractor and written approval by the Architect and Owner. Substitutions shall be submitted in accordance with the requirements listed in Article 3.3.2.

3.3.5: Add new paragraph 3.3.5 as follows:

Approval by the Owner and the Architect of any such substitution shall not relieve the Contractor requesting the substitution of any responsibility for additional costs incurred by other trades for changes made necessary to accommodate the substituted item.

3.4.1: Delete paragraph 3.4.1 in its' entirety and substitute with the following:

Addenda will be issued by the Owner and will be mailed to all who are known by the Owner to have received a completed set of Bidding Documents.

ARTICLE 4 - BIDDING PROCEDURES

4.1.6: Add the following words to the beginning of paragraph - "Unless otherwise provided in the Contract Bidding Documents".

4.1.7: Delete paragraph 4.1.7 in its' entirety and substitute with the following:

Each copy of the Bid shall include the legal name of the bidder and a statement that the Bidder is a sole proprietor, partnership, corporation or other legal entity. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and, if the Owner so requests, have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

4.2.2: Delete paragraph 4.2.2 in its' entirety and substitute with the following:

Surety Bonds shall be written on forms substantially similar in content to AIA Document A310, and executed by a company authorized to transact business within the State of Connecticut, and the attorney-in-fact who executes the Bond on behalf of the Surety shall affix to the Bond a certified and current copy of his power of attorney.

ARTICLE 5 - CONSIDERATION OF BID

5.1.1: Add new paragraph 5.1.1 as follows:

Bidders are encouraged to attend the Town's bid opening at which time the public is afforded an opportunity to record bid prices received in response to the Town's solicitation. Bidders who would like the results of the bid but are unable to attend the bid opening must submit with their bid a self addressed stamped envelope and note requesting a copy of the bid results. **BIDDERS CALLING THE PURCHASING OFFICE FOR BID RESULTS WILL BE REFERRED TO THE ABOVE PROCEDURE.**

5.3.1: Delete 1st sentence and substitute the following:

It is the intent of the Owner to award a Contract to the bidder providing the best value to the Owner and is in accordance with requirements of the Bidding Documents and does not exceed the funds available.

5.3.3: Add new paragraph 5.3.3 as follows:

The Owner in awarding the Contract shall be guided by pertinent provisions of the "Town Charter" and "Code of Ordinances".

5.3.4: Add new paragraph 5.3.4 as follows:

A Bid may be rejected if the Bidder cannot show that he has the necessary supervisory staff, labor, capital, materials, machinery and resources to commence the work at the time prescribed and thereafter to prosecute and complete the Work at the rate or time specified; and that he is not already obligated for other work which would delay the commencement, prosecution, or completion of this work. A Bid may also be rejected if the bidder has previously failed to complete a contract within the time required, had previously performed similar work in an unsatisfactory manner, or in the judgment of the Owner is deemed unable to satisfactorily perform the Work.

5.3.5: Add new paragraph 5.3.5 as follows:

Prior to the award of a Contract, if so requested, Bidders must present satisfactory evidence that they have been regularly engaged in the business of doing such Work as they propose to execute and that they are prepared with the necessary supervisory staff, labor, capital, materials, and machinery, resources and responsibilities to conduct and complete the work to be contracted for in accordance with the Contract Documents and to begin it promptly when ordered.

ARTICLE 6 - POST BID INFORMATION

6.3.3: Delete paragraph 6.3.3 in its' entirety and substitute with the following:

Prior to the award of the Contract, the Owner will notify the Bidder in writing if either the Owner or the Architect, after due investigation, has a reasonable objection to any such proposed person or entity. If the Owner or Architect has reasonable objection to any such proposed person or entity, the Bidder may, at his option, (1) withdraw his Bid, or (2) submit an acceptable substitute person or entity. In the event of withdrawal under this sub-paragraph, Bid Security will not be forfeited, notwithstanding the provisions of Paragraph 4.4.1.

ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

7.1.1: Delete paragraph 7.1.1 in its' entirety and substitute with the following:

If the amount of the Contract to be awarded is Fifty Thousand Dollars (\$50,000) or more, the successful Contract Bidder shall furnish and pay for Surety in the full amount of the Contract. This Bond shall provide 100% security for faithful performance and for payment of all persons performing labor or furnishing materials in connection with this Contract and shall be executed by a company authorized to transact business within the State of Connecticut.

The Contractor shall increase the principal amount of the performance and labor and materials payments bond(s) in direct proportion to any increase in the value of the Contract resulting from such change orders.

7.2.1: Delete paragraph 7.2.1 and substitute the following:

The Bidder shall deliver the required bonds to the Owner prior to execution of a contract and not later than (5) five days from notice of the Owner's intent to award the Contract to the bidder.

ARTICLE 9 - SUPPLEMENTARY INSTRUCTIONS

9.1: Add new paragraph 9.1 as follows:

9.1.1 - The Contractor shall agree that, except in the case of bona fide occupational qualification or need, neither he nor his Subcontractors and/or agents will refuse to hire or employ, or will bar or discharge from employment, or will otherwise discriminate against any individual in compensation or in terms, conditions, or privileges of employment because of race, color, national origin, ancestry, present or past history of mental disorder, mental retardation, or physical disability, including, but not limited to, blindness.

9.1.2 - The Contractor shall further agree that neither he nor his subcontractors and/or agents will discharge, expel, or otherwise discriminate against any person because he/she has opposed any discriminatory employment practice or because he has filed a complaint or testified or assisted in any proceeding under Connecticut General Statutes Sections 46a-82, 46a-83, or 46a-84 or as may be amended.

9.1.3 - The Contractor shall further agree that, except in the case of a bona fide occupational qualification or need, neither he nor his subcontractors and/or agents will advertise employment opportunities in such manner as to restrict such employment so as to discriminate against individuals because of their race, color, religious creed, age, sex, marital status, national origin, ancestry, present or past history of mental disorder, mental retardation or physical disability, including, but not limited to, blindness.

9.1.4 - The terms used in paragraphs 9.1.1, 9.1.2, and 9.1.3 shall have the definitions set forth in Connecticut General Statutes Section 46a-51 or as may be amended.

9.1.5 - The Contractor further agrees, for himself, his subcontractors, and agents, not to otherwise discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, sex, marital status, national origin, ancestry, present or past history of mental disorder, mental retardation or physical disability (including but not limited to blindness) in any manner prohibited by the laws and regulations of the United States, State of Connecticut or Town of West Hartford.

9.2: Add new paragraph 9.2 as follows:

Time: The Contractor to whom this Contract may be awarded, will be required to commence work at the site within ten (10) days of Contract signing unless, otherwise indicated in the sample AIA Standard Form of Agreement Form A101. The work shall be executed diligently thereafter and shall be completed in accordance with the Contract Documents.

9.3: Add new paragraph 9.3 as follows:

The Bidder is directed to the Bid Forms for additional information, instructions, qualifications and requirements.

Bid of _____, BIDDER,
(Name of Bidder)

FOR **AIR HANDLING UNIT REPLACEMENT AT SEDGWICK MIDDLE SCHOOL BID #210001**
FOR THE TOWN OF WEST HARTFORD, CONNECTICUT.

To: Town of West Hartford
Peter Privitera, Purchasing Agent
Purchasing Services

The undersigned proposes to furnish all labor, materials and equipment, and to perform all work described in the Contract Bidding Documents for **AIR HANDLING UNIT REPLACEMENT AT SEDGWICK MIDDLE SCHOOL BID #210001** in accordance with the Contract Bidding Documents for the amounts shown herein under Schedule of Bids.

Receipt acknowledged of the following addenda:

Addendum No. _____	Dated _____

It is understood and agreed that the Owner has the privilege of rejecting any or all Bids and of waiving informality in any Bid.

It is further understood and agreed that this Bid shall be irrevocable for ninety (90) calendar days after Bid receipt date.

SCHEDULE OF BIDS

1. Base Bid No. 1 for furnishing all labor, materials, equipment and all else whatsoever necessary to perform all work described in the Contract Bidding Documents for **AIR HANDLING UNIT REPLACEMENT AT SEDGWICK MIDDLE SCHOOL BID #210001**

for the lump sum of _____
_____ Dollars (\$ _____)

CONTRACT TIME

The undersigned Bidder will accomplish all Work required by the Contract Bidding Documents and will provide Substantial completion by **November 1, 2020** and will provide the Project, ready for Final Completion, by **November 15, 2020**.

BIDDER QUALIFICATIONS

- A: If the Bidder is a Corporation, fill out:

The Bidder is a Corporation, organized under the laws of _____, having its principal office at _____.
The Principal Officers of said Corporation, with their titles and addresses, are as follows:

All persons interested in the Bid as principals are to be named above.

- B. Bid must be accompanied by either a certified check, treasurer's check or a Bid Bond, as provided in the Invitation to Bid. If a check is enclosed herein, fill out the following:

(Name of Bank) (Address of Bank) (Amount of Check)

- C. Attached hereto are two forms entitled "Summary of Work History". The Bidder is required to complete Form 1 and 2.

- D. The Bidder is required to submit a Certificate of Insurance in amounts and types specified in Insurance Exhibit or provide a letter from the Bidder's insurance agent or broker that such insurance is obtainable at the time of execution of the Agreement and that a Certificate of Insurance shall be provided to that effect not later than the date of Contract signing. (See page #00204-7)
- E. Contract award will be by AIA Agreement Form 101. A copy of the AIA Form 101 is included for the Bidder's information. The parties shall enter into an Agreement in substantially the same form as the attached subject to technical and other modifications as the parties mutually agree. A purchase order shall be issued by the Town subsequent to the execution of the Agreement.
- F. The Contractor by executing this Bid agrees and represents that no person acting for or employed by the Town of West Hartford is directly or indirectly interested in the Bid or proposed Agreement or in the supplies or works to which it relates, or will receive any part of the profit or any commission there from in any manner which is unethical or contrary to the best interest of the Owner.
- G. The Contractor agrees and warrants that in the performance of this Contract it will not discriminate or permit discrimination against any person or group of persons on the grounds of sex, race, color, religion, age, marital status, ancestry, national origin, past history of mental disorder, mental retardation or physical disability or other basis in any manner prohibited by the laws of the United States, the State of Connecticut, or the Town of West Hartford.
- H. The Contractor shall employ a full time, on-the-job Project Superintendent as his representative.
- I. The Contractor and/or Subcontractor offers and agrees to assign to the Town of West Hartford and/or the West Hartford Board of Education all rights, titles and interest in all causes of action it may have under Section 4 of the Clayton Act., 15 U.S.C. Section 15, or under Connecticut General Statutes 35-24 et. seq., as amended, arising out of the purchase of services, property, or intangibles of any kind pursuant to the Agreement, or Subcontracts thereunder. This assignment shall be made and become effective at the time the Town/Board awards or accepts such Agreement, without further acknowledgment by the parties. In the alternative, at the option of the Town, the Contractor and/or Subcontractor agrees to pay to the Town its proportionate share of recoveries for anti-trust violations which relate to purchases pursuant to this Contract, or Subcontracts hereunder. The Contractor and/or Subcontractor agrees promptly to notify the Purchasing Agent of the Town of West Hartford of suspected anti-trust violations and claims.

J. The Bidder is aware of and agrees that, if awarded an Agreement, he is bound by the following indemnification language:

1. To the fullest extent permitted by law, the Contractor shall release, defend, indemnify, and hold harmless the Town of West Hartford, and the West Hartford Board of Education, their respective boards, commissions, officers, officials, employees, agents, representatives, and servants from any and all suits, claims, losses, damages, costs (including without limitation reasonable attorneys' fees), compensation, penalties, fines, liabilities or judgments or any name or nature for:

1. Bodily injury, sickness, disease, or death; and/or
2. Damage to or destruction of property, real or personal; and/or
3. Financial losses (including, without limitation, those caused by loss of use)

sustained by any person or concern, including officers, employees, agents, Subcontractors or servants of the Town, the Board of Education, or the Contractor, or by the public, which is cause or alleged to have been caused in whole or in part by the negligent act(s) or omission(s) of the Contractor, its officers, employees, agents, or Subcontractors, in the performance of this Agreement or from the inaccuracy of any representation or warranty of the Contractor contained in the Contract Documents. This indemnity shall not be affected by other portions of the Agreement relating to insurance requirements.

2. To the fullest extent permitted by law, the Contractor agrees to release, defend, indemnify, and hold harmless the West Hartford Board of Education, and the Town of West Hartford, their respective boards and commissions, officials, officers, employees, agents, representatives, and servants from any loss, claim, cost penalty, fine or damage that may arise out of the failure of the Contractor, its officers, agents, employees or Subcontractors to comply with any laws or regulations of the United States of America, the State of Connecticut, the Town of West Hartford, West Hartford Board of Education, or their respective agencies. This undertaking shall not be affected by other portions of the Agreement relating to insurance requirements.

K. Substantial completion must be achieved by **November 1, 2020** and final completion must be achieved by **November 15, 2020**. The Contractor shall pay the Owner liquidated damages in the amount of \$1,000.00 per calendar day, which sum is hereby agreed upon, and shall be assessed not as a penalty, but as liquidated damages which the Owner shall suffer by reason of such default. The Owner and Contractor shall acknowledge that failure to effect substantial completion as noted above will precipitate inconvenience and disruption. The Owner and Contractor shall acknowledge that such damages are uncertain or difficult to prove and that the amounts established herein are reasonable assessment of these damages.

BIDDER:

COMPANY

Bidder must sign. Failure to provide an original signature will result in rejection of the bid.

®

SIGNATURE BY DULY AUTHORIZED
(SEAL)

PRINT OR TYPE NAME

The bidder agrees that by affixing their signature to this request for bids, the authorized signatory grants approval to the Town of West Hartford to obtain third party credit reports for the purpose of assessing the financial capacity of the business entity tendering such bid to the Town.

TITLE

DATE

ADDRESS

TELEPHONE

FAX #

E-MAIL

VENDOR FEIN #

BID FORMS TO BE SUBMITTED IN DUPLICATE

If you are not registered with the Town of West Hartford, please go to <https://selfservice.westhartfordct.gov/MSS/Vendors/default.aspx> and select register. Only registered vendors can be awarded the contract.

00204-5

TO: Town of West Hartford
Peter Privitera
Purchasing Agent

FROM:

CLIENT:

DATE:

Dear Mr. Privitera:

In accordance with page 00204-3, Paragraph D of the "Bid Form", please be advised that my client currently has or will have by the date of the execution of the Agreement for this project, a Certificate of Insurance in amounts and types as specified in Article 11 of the Supplementary General Conditions.

Signature
Authorized Agent or Broker

00204-6

INDEMNIFICATION AND INSURANCE EXHIBIT
Indemnification and Insurance Exhibit
Professional Contractor Services w/Envir
Sedgwick Middle School

For purpose of this Exhibit, the term "Contractor" shall also include their respective officers, agents, representatives, employees, and contractors of any tier; and the term "Town of West Hartford and West Hartford Board of Education" (hereinafter called the "Town") shall include their respective boards, commissions, officers, officials, employees, agents, representatives, and volunteers.

I. INDEMNIFICATION

- A. To the fullest extent permitted by law, the Contractor shall release, defend, indemnify, and hold harmless the Town of West Hartford, West Hartford Board of Education, and their respective boards, commissions, officers, officials, employees, agents, representatives and volunteers from any and all liabilities resulting from suits, claims, losses, damages, costs (including without limitation reasonable attorneys' fees), compensation, penalties, fines, liabilities or judgments of any name or nature for bodily injury, sickness, disease, or death; and/or damage to or destruction of real and/or personal property; and/or financial losses (including, without limitation, those caused by loss of use) sustained by any person or concern, including officers, employees, agents, contractors of any tier, or volunteers of the Town of West Hartford and West Hartford Board of Education, or the Contractor, or by the public, caused in whole or in part by any and all negligent or intentional acts, errors or omissions of the Contractor, its officers, agents, contractors of any tier, or anyone directly or indirectly employed by them arising from or related to the performance of this Contract.
- B. To the fullest extent permitted by law, the Contractor shall release, defend, indemnify, and hold harmless the Town of West Hartford, West Hartford Board of Education, and their respective boards, commissions, officers, officials, employees, agents, representatives and volunteers from any and all suits, claims, damages, costs, (including without limitation reasonable attorneys' fees), compensation, penalties, fines, liabilities or judgments that may arise out of the failure of the Contractor, its officers, agents, contractors of any tier, or anyone directly or indirectly employed by them to comply with any laws, statutes, ordinances, building codes, and rules and regulations of the United States of America, the State of Connecticut, the Town of West Hartford, or their respective agencies.
- C. To the fullest extent permitted by law, the Contractor agrees to defend, indemnify and hold harmless Town of West Hartford, West Hartford Board of Education, and their respective boards, commissions, officers, officials, employees, agents, representatives and volunteers from any and all suits, claims, losses, damages, costs (including, without limitation, reasonable attorney's fees), compensations, penalties, fines, liabilities or judgments, on account of or in connection with any death of person or injury, loss or damage to any person, property, or to the environment, arising out of the activity of the type contemplated by this Contract, whether or not said activity complies strictly with the requirements of this Contract and, arises out of or in connection with;
- a. the violation or breach, by any employee or person acting on behalf of the Contractor of any federal, state, or local environmental statute, rule, regulation, ordinance, or other law or any provision or requirement of the Contract dealing with hazardous substances or protection of the environment; or
 - b. the release or discharge, onto any public or private property, of any hazardous substances, regardless of the source of such hazardous substances, by any employee or person acting on behalf of the Contractor; or

- c. the subsequent storage, processing or other handling of such hazardous substances by any person or entity after they have been removed by the Contractor or persons acting on the Contractor's behalf.
- D. This duty to indemnify shall not be constrained or affected by the Contractor's insurance coverage or limits, or any other portion of the Contract relating to insurance requirements. It's agreed that the Contractor's responsibilities and obligations to indemnify shall survive the completion, expiration, suspension or termination of the Contract.

II. INSURANCE

A. Insurance Requirements

1. The Contractor shall obtain and maintain at its own cost and expense all the insurance described below continuously for the duration of the Contract, including any and all extensions, except as defined otherwise in this Exhibit.
2. Contractor's policies shall be written by insurance companies authorized to do business in the State of Connecticut, with a Best's rating of no less than A:VII, or otherwise approved by the Town.
3. All policies (with the exception of Worker's Compensation and Professional Liability) shall be endorsed to include the Town of West Hartford, West Hartford Board of Education, and their respective boards, commissions, officers, officials, employees, agents, representatives, and volunteers as an Additional Insured. The coverage shall include, but not be limited to, investigation, defense, settlement, judgment or payment of any legal liability. Blanket Additional Insured Endorsements are acceptable. Any Insured vs. Insured language shall be amended to eliminate any conflicts or coverage restrictions between the respective Insureds.
4. When the Town or the Contractor is damaged by failure of the Contractor to purchase or maintain insurance required under this Exhibit, the Contractor shall bear all reasonable costs including, but not limited to, attorney's fees and costs of litigation properly attributable thereto.

B. Required Insurance Coverages:

1. **Commercial General Liability:** \$1,000,000 each occurrence / \$2,000,000 aggregate for premises/operations, products/ completed operations, contractual liability, independent contractors, personal injury and broad form property damage. Contractor shall continue to provide products/ completed operations coverage for two (2) years after completion of the work to be performed under this Contract.
2. **Automobile Liability and Physical Damage Coverage:** \$1,000,000 each accident for any auto, including uninsured/underinsured motorist coverage and medical payments. Policy shall include collision and comprehensive physical damage coverage.
3. **Umbrella Liability:** \$2,000,000 each occurrence / \$4,000,000 aggregate, following form.
4. **Workers' Compensation and Employer's Liability:** Statutory coverage in compliance with the Workers' Compensation laws of the State of Connecticut. Policy shall include Employer's Liability with minimum limits of \$1,000,000 each accident, \$1,000,000 disease/policy limit, \$1,000,000 disease/each employee.

The Contractor represents that they are currently in compliance with all requirements of the State of Connecticut Workers' Compensation Act and that it shall remain in compliance for the duration of the Contract. The Contractor agrees that Workers' Compensation is their sole remedy and shall indemnify and hold harmless the Town from all suits, claims, and actions arising from personal injuries to the Contractor, however caused. This indemnity shall not be affected by a lapse of Workers' Compensation coverage and/or if the Contractor failed, neglected, refused or is unable to obtain Workers' Compensation insurance.

5. **Contractor's Pollution Coverage:** \$3,000,000 each occurrence **project specific limit** / \$6,000,000 aggregate dedicated to work performed under this Contract only, unless otherwise approved by the Town's Risk Manager. Policy must specifically include pollution coverage for bodily injury, property damage, cleanup costs, disposal costs, non-owned disposal sites, defense costs, contractual liability and completed operations for all work performed by or on behalf of the Contractor under the Contract. Policy exclusions or limitations affecting work performed must be deleted. Policy form must be "pay on behalf of rather than "indemnity" and insurance company must have the "right and duty" to defend. The policy shall not contain any provision or definition that would serve to eliminate third party action over claims for employees of the Contractor. Policy shall state that insolvency or bankruptcy of the insured or the insured's estate will not relieve the insurance company of its obligations. The Contractor shall maintain completed operations coverage for two (2) years after completion of the work to be performed under this Contract.
6. **Professional Environmental Liability Coverage (claims-made):** \$2,000,000 each occurrence / \$2,000,000 aggregate. Policy must specifically include pollution coverage for bodily injury, property damage, cleanup costs and defense costs for all work performed by or on behalf of the Contractor. Exclusions or limitations affecting work performed must be deleted. Policy form must be "pay on behalf of" rather than "indemnity" and insurance company must have the "right" to defend. The policy shall not contain any provision or definition that would serve to eliminate third party action over claims for employees of the Contractor. Policy shall state that insolvency or bankruptcy of the insured or the insured's estate will not relieve the insurance company of its obligations. Retroactive date under the policy shall precede the effective date of this Contract. The Contractor shall maintain continuous coverage or obtain an extended reporting period in which to report claims for three (3) years after completion of the work to be performed under this Contract.
7. **Valuable Papers and Records Coverage:** \$50,000 limit to reestablish, recreate or restore any and all records, papers, maps, statistics, survey notes and other data, if made unavailable by fire, theft, flood, or any other cause, regardless of the physical location of these insured items.
8. **Personal Property:** All personal property of the Contractor are the sole risk of the Contractor. The Contractor agrees to indemnify, defend and hold harmless the Town from any and all losses or damages, however caused, to any and all personal property belonging to the Contractor.

C. **Additional Terms**

1. **Minimum Scope and Limits:** The Contractor's insurance shall meet the scope and limits of insurance specified in this Exhibit, or required by applicable federal, state and/or municipal law, regulation or requirement, whichever coverage is greater. The limits of insurance stated herein for each type of insurance are minimum limits only. If the Contractor's policy provides greater limits, then the Town shall be entitled to the full limits of such policy and this Exhibit shall be deemed to require such full limits.

Acceptance by the Town of insurance submitted by the Contractor does not relieve or decrease in any manner the liability of the Contractor arising out of or in connection with this Contract. The Contractor

is responsible for any losses, claims and costs of any kind which exceed the Contractor's limits of liability, or which may be outside the coverage scope of the policies, or a result of non-compliance with any laws including, but not limited to, environmental laws. The requirements herein are not intended, and shall not be construed to limit or eliminate the liability of the Contractor that arises from the Contract.

2. Certificates of Insurance: The Contractor shall provide certificates of insurance, policy endorsements, declaration page(s) or provisions acceptable to the Town confirming compliance with this Exhibit and thereafter upon renewal or replacement of each required policy of insurance. Upon request, the Contractor agrees to furnish complete copies of the required policies.
3. Subcontractors: Contractor shall cause all contractors of any tier, acting on its behalf, to comply with this Exhibit. The Contractor shall either include its contractors as an Insured under its insurance policies or furnish separate certificates of insurance and endorsements for each subcontractor.
4. Premiums, Deductibles and Other Liabilities: Any and all related costs, including but not limited to, deductibles, retentions, losses, claim expenses, premiums, taxes, and audit charges earned are the sole responsibility of the Contractor.
5. Occurrence Form, Primary and Non-Contributory:. All required insurance coverage shall be written on an occurrence basis, except as defined otherwise in this Exhibit. All policies (including primary, excess and/or umbrella) shall be primary and non-contributory with respect to any other insurance or self-insurance maintained by or available to the Town.
6. Claims-made Form: Insurance coverage written on a claims-made basis shall have a retroactive date that precedes the effective date of this Contract. The Contractor shall maintain continuous coverage or obtain an extended reporting period in which to report claims following end of the Contract, for a minimum of two (2) years, except as defined otherwise in this Exhibit.
7. Waiver of Rights of Recovery: Both the Contractor and Contractor's insurers shall waive their rights of recovery or subrogation against the Town.
8. Claim Reporting: Any failure of the Contractor to comply with the claim reporting provisions of the required insurance policies shall not relieve the Contractor of any liability or indemnification in favor of the Town for losses which otherwise would have been covered by said policies.
9. Cancellation Notice: Each required insurance policy shall not be suspended, voided, cancelled or reduced except after thirty (30) days prior written notice has been given to the Town, ten (10) days for non-payment of premium.
10. Compliance: Failure to comply with any of the indemnification or insurance requirements may be held a willful violation and basis for immediate termination of the Contract

3.0 LABOR REQUIREMENTS

Since there are other projects anticipated to be in progress at this location during this time period, ALL BIDS MUST INCORPORATE STATE OF CONNECTICUT PREVAILING WAGE RATES AS PROVIDED IN THIS DOCUMENT. The awarded bidder will be required to pay prevailing wages.

3.01 PREVAILING WAGE RATES

- 3.01.01 The Contractor shall certify in writing and under oath to the Labor Commissioner the pay scale to be used by the Contractor and any Subcontractors. The provisions of this section shall not apply where the total cost of all work to be performed by ALL Contractors and Subcontractors in connection with new construction of any public works project is less than FOUR HUNDRED thousand dollars or where the total cost of all work to be performed by ALL Contractors and Subcontractors in connection with any remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project is less than ONE HUNDRED thousand dollars. The Contractor shall fully comply with all provisions of Connecticut General Statutes (CGS) 31-53 and shall be subject to such sanctions mandated for violations of said Public Act.
- 3.01.02 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 CGS 31-53 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 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 pay day.
- 3.01.03 The contractor shall not be paid in accordance with the payment provisions of these Contract Bidding Documents unless the contractor is in full compliance with the mandates of CGS 31-53.
- 3.01.04 Bidders are further advised that if the initial consideration due and payable pursuant to the Contract exceeds the mandatory limits at which prevailing wages rates are required, then the contractor and any subcontractors shall pay the appropriate prevailing wages retroactive to the date of commencement of work on the project. The contractor shall not receive any additional compensation from the Owner as a result of an occurrence of the aforementioned event.

Minimum Rates and Classifications for Building Construction

ID#: 20-14006

**Connecticut Department of Labor
Wage and Workplace Standards Division**

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

Project Number: West Hartford

Project Town: West Hartford

State#: West Hartford

FAP#: West Hartford

Project: Air Handling Unit Replacement at Sedgwick Middle School (West Hartford)

CLASSIFICATION	Hourly Rate	Benefits
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, concrete specialists, wrecking laborers, fire watchers.	31.0	22.15
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofers/mixer/nozzleman (Person running mixer and spraying fireproof only).	31.25	22.15

Project: Air Handling Unit Replacement at Sedgwick Middle School (West Hartford)

4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	31.5	22.15
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.	32.0	22.15
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	31.75	22.15
4e) Group 6: Blasters, nuclear and toxic waste removal.	34.0	22.15
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	32.0	22.15
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	29.28	22.15
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	28.74	22.15
4i) Group 10: Traffic Control Signalman	18.0	22.15
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.	34.53	25.64
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)	40.25	29.17+3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	55.12	34.765+a+b
-----LINE CONSTRUCTION-----		
Groundman	26.5	6.5% + 9.00
Linemen/Cable Splicer	48.19	6.5% + 22.00
8) Glazier (Trade License required: FG-1,2)	39.18	22.55 + a

As of: July 16, 2020

Project: Air Handling Unit Replacement at Sedgwick Middle School (West Hartford)

9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection 36.67 37.62 + a

----OPERATORS----

Group 1: Crane handling or erecting structural steel or stone, hoisting engineer 2 drums or over, front end loader (7 cubic yards or over), work boat 26 ft. and over and Tunnel Boring Machines. (Trade License Required) 42.45 25.30 + a

Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver (\$3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required) 42.11 25.30 + a

Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar); Grader Operator; Bulldozer Fine Grade. (slopes, shaping, laser or GPS, etc.). (Trade License Required) 41.32 25.30 + a

Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper). 40.91 25.30 + 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 40.28 25.30 + a

Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine. 40.28 25.30 + a

Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer). 39.95 25.30 + a

Group 7: Asphalt roller, concrete saws and cutters (ride on types), vermeer concrete cutter, Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24 39.59 25.30 + a

Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine. 39.17 25.30 + a

Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder). 38.71 25.30 + a

Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc. 36.54 25.30 + a

Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment. 36.54 25.30 + a

As of: July 16, 2020

Project: Air Handling Unit Replacement at Sedgwick Middle School (West Hartford)

Group 12: Wellpoint operator.	36.48	25.30 + a
Group 13: Compressor battery operator.	35.86	25.30 + a
Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	34.66	25.30 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	34.23	25.30 + a
Group 16: Maintenance Engineer/Oiler.	33.54	25.30 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	38.11	25.30 + a
Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	35.53	25.30 + a
-----PAINTERS (Including Drywall Finishing)-----		
10a) Brush and Roller	35.62	22.55
10b) Taping Only/Drywall Finishing	36.37	22.55
10c) Paperhanger and Red Label	36.12	22.55
10e) Blast and Spray	38.62	22.55
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	44.63	32.95
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
13) Roofer (composition)	38.4	21.35
14) Roofer (slate & tile)	38.9	21.35
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	38.9	39.46
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)	44.63	32.95

As of: July 16, 2020

Project: Air Handling Unit Replacement at Sedgwick Middle School (West Hartford)

-----TRUCK DRIVERS-----

17a) 2 Axle	29.86	25.79 + a
17b) 3 Axle, 2 Axle Ready Mix	29.97	25.79 + a
17c) 3 Axle Ready Mix	30.03	25.79 + a
17d) 4 Axle, Heavy Duty Trailer up to 40 tons	30.08	25.79 + a
17e) 4 Axle Ready Mix	30.13	25.79 + a
17f) Heavy Duty Trailer (40 Tons and Over)	30.35	25.79 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	30.13	25.79 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	45.92	26.08 + a
19) Theatrical Stage Journeyman	25.76	7.34

As of: July 16, 2020

Project: Air Handling Unit Replacement at Sedgwick Middle School (West Hartford)

Welders: Rate for craft to which welding is incidental.

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

***Note: Hazardous waste premium \$3.00 per hour over classified rate*

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

- 1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)**
- 2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson**
- 3) Cranes (under 100 ton rated capacity)**

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

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

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyman instructing and supervising the work of each apprentice in a specific trade.

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

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

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

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

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

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

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

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.

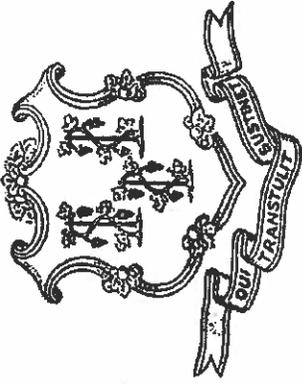
As of: July 16, 2020

Project: Air Handling Unit Replacement at Sedgwick Middle School (West Hartford)

--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: July 16, 2020



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.

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

(applicable to public building contracts entered into *on or after July 1, 2007*, where the total cost of all work to be performed is at least \$100,000)

- (1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);
- (2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;
- (3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least \$100,000;
- (4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;
- (5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;
- (6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;
- (7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;
- (8) Proof of completion may be demonstrated through either: (a) the presentation of a *bona fide* student course completion card issued by the federal OSHA Training Institute; *or* (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;
- (9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

- (10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;
- (11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;
- (12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;
- (13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;
- (14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and
- (15) Regulations clarifying the statute are currently in the regulatory process, and shall be posted on the CTDOL website as soon as they are adopted in final form.
- (16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of <http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm>; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTIMATELY 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.

Information Bulletin ***Occupational Classifications***

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

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

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

- **ASBESTOS WORKERS**

Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- **ASBESTOS INSULATOR**

Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- **BOILERMAKERS**

Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**

Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- **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.

- **LABORER, CLEANING**

- The clean up of any construction debris and the general (heavy/light) cleaning, including sweeping, wash down, mopping, wiping of the construction facility and its furniture, washing, polishing, and dusting.

- **DELIVERY PERSONNEL**

- If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages 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 or 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 require equal composite workforce.

- **IRONWORKERS**

Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which require equal composite workforce.

- **INSULATOR**

- Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings.

- **LABORERS**

Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), decorative security fence (non-metal)).

installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

- **PAINTERS**

Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hhg for any and all types of building and residential work.

- **LEAD PAINT REMOVAL**

- Painter's Rate

1. Removal of lead paint from bridges.
2. Removal of lead paint as preparation of any surface to be repainted.
3. Where removal is on a Demolition project prior to reconstruction.

- Laborer's Rate

1. Removal of lead paint from any surface NOT to be repainted.
2. Where removal is on a *TOTAL* Demolition project only.

- **PLUMBERS AND PIPEFITTERS**

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

- **POWER EQUIPMENT OPERATORS**

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

- **ROOFERS**

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

- **SHEETMETAL WORKERS**

Fabricate, assemble, install and repair 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, fascia, louvers, partitions, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers. To include testing and air-balancing ancillary to installation and construction.

- **SPRINKLER FITTERS**

Installation, alteration, maintenance and repair of fire protection sprinkler systems.

**License required per Connecticut General Statutes: F-1,2,3,4.*

- **TILE MARBLE AND TERRAZZO FINISHERS**

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

- **TRUCK DRIVERS**

~How to pay truck drivers delivering asphalt is under REVISION~

Truck Drivers are required to be paid prevailing wage for time spent "working" directly on the site. These drivers remain covered by the prevailing wage for any time spent transporting between the actual construction location and facilities (such as fabrication, plants, mobile factories, batch plant, borrow pits, job headquarters, tool yards, etc.) dedicated exclusively, or nearly so, to performance of the contract or project, which are so located in proximity to the actual construction location that it is reasonable to include them. **License required, drivers only, per Connecticut General Statutes.*

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

➤ *Any questions regarding the proper classification should be directed to:*
Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543.

**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.

AIA® Document A101® – 2017

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

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Town of West Hartford
50 South Main Street
West Hartford, CT 06107

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

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

Air Handling Unit Replacement at Sedgwick Middle School Bid# 210001
128 Sedgwick Road
West Hartford, CT

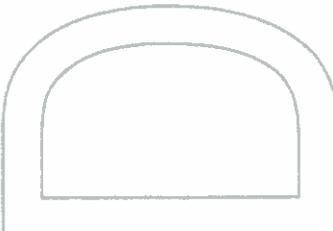
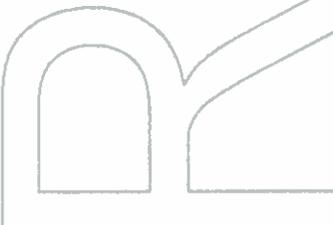
The Architect:
(Name, legal status, address and other information)

Lucian Dragulski, PE
Bemis Associates LLC
-
185 Main Street
Farmington, CT 06032

The Owner and Contractor agree as follows.

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.



ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS**
- 2 THE WORK OF THIS CONTRACT**
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION**
- 4 CONTRACT SUM**
- 5 PAYMENTS**
- 6 DISPUTE RESOLUTION**
- 7 TERMINATION OR SUSPENSION**
- 8 MISCELLANEOUS PROVISIONS**
- 9 ENUMERATION OF CONTRACT DOCUMENTS**

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other 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

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.
- 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)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 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 [] ([]) calendar days from the date of commencement of the Work.

[X] By the following date: November 1, 2020

§ 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
[REDACTED]	[REDACTED]

§ 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.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
<u>Base Bid</u>	[REDACTED]

§ 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
<u>Base Bid</u>	[REDACTED]	[REDACTED]

§ 4.3 Allowances, if any, included in the Contract Sum: (Identify each allowance.)

Item	Price
[REDACTED]	[REDACTED]

§ 4.4 Unit prices, if any:

(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
[REDACTED]	[REDACTED]	[REDACTED]

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

Liquidated Damages in the amount of \$300.00 (Three Hundred Dollars) per calendar day shall be assess for the failure to achieve Substantial Completion of the work not later than Commencement Date as stated above and Final Completion of the Work also stated above.

§ 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

[REDACTED]

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, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the first day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the first Friday after the Fifteenth day of the same month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than fifteen (15) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 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 may require. This schedule of values 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 In accordance with AIA Document ~~A201™-2017~~, ~~A201™-2007~~, General Conditions of the Contract for Construction, and subject to other 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~~; Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of Five percent (5 %).
- 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, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- 3 ~~That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified, less retainage of Five percent (5 %);~~

§ 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 AIA Document ~~A201-2017~~; ~~A201-2007~~;
- 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 AIA Document ~~A201-2017~~; ~~A201-2007~~; and
- 5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document ~~A201-2017~~, A201-2007.

§ 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 Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document ~~A201-2017~~, A201-2007, 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 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

0.00 % per annum

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document ~~A201-2017~~, A201-2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document ~~A201-2017, A201-2007~~, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

Arbitration pursuant to Section 15.4 of AIA Document ~~A201-2017~~A201-2007

Litigation in a court of competent jurisdiction

Other (Specify)

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction ~~jurisdiction~~ in Hartford County, Connecticut.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article ~~14~~ of AIA Document ~~A201-2017~~A201-2007.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document ~~A201-2017, A201-2007~~, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document ~~A201-2017~~A201-2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document ~~A201-2017~~A201-2007 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's representative:
(Name, address, email address, and other information)

Michael Longo, Facilities Manager 860-561-7927
Town of West Hartford
50 South Main Street
West Hartford, CT 06107

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™-2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201-2017, A201-2007, may be given in accordance with AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203-2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- ~~.1~~ AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor
- ~~.2~~ AIA Document A101™-2017, Exhibit A, Insurance and Bonds
- ~~.3~~ AIA Document A201™-2017, A201™-2007, General Conditions of the Contract for Construction
- ~~.4~~ AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement)

~~.5~~ .3 Drawings

Number	Title	Date
--------	-------	------

COVER

S1.1 DUNNAGE FRAMING PLAN AND DETAILS

MEO.1 MECHANICAL/ ELECTRICAL GENERAL NOTES AND SYMBOLS

MED1.1 MECHANICAL/ ELECTRICAL DEMOLITION WORK- GROUND FLOOR

MED1.2 MECHANICAL/ ELECTRICAL DEMOLITION WORK- FIRST FLOOR

MED1.3 MECHANICAL/ ELECTRICAL DEMOLITION WORK- SECOND FLOOR

ME1.1 MECHANICAL/ ELECTRICAL NEW WORK- GROUND FLOOR

ME1.2 MECHANICAL/ ELECTRICAL NEW WORK- FIRST FLOOR

ME1.3 MECHANICAL/ ELECTRICAL NEW WORK- SECOND FLOOR

M2.0 MECHANICAL SCHEDULES

M3.0 MECHANICAL DETAILS

~~6~~ 4 Specifications are those contained in the Project Specifications Document Bid#210001 and are as in Section 9.1.8 below.

Section	Title	Date	Pages

7 DIVISION 23 – MECHANICAL

- 20 00 50 GENERAL CONDITIONS FOR MECHANICAL AND ELECTRICAL SYSTEMS
- 23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC
- 23 07 00 HVAC INSULATION
- 23 09 13 INSTRUMENTATION AND CONTROLS FOR HVAC
- 23 21 13 HYDRONIC PIPING
- 23 31 13 METAL DUCTS
- 23 63 13 AIR COOLED CONDENSING UNIT
- 23 73 13 CUSTOM AIR HANDLING UNITS
- DIVISION 26 – ELECTRICAL
- 26 00 00 GENERAL ELECTRICAL
- 26 05 00 BASIC ELECTRICAL MATERIALS & METHODS

5 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

~~8~~ 6 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

The Sustainability Plan:

Title	Date	Pages

Supplementary and other Conditions of the ~~Contract~~ Contract are those contained in the Project Specifications Document Bid#210001 and are as follows:

Document	Title	Date	Pages

9 INSTRUCTIONS TO BIDDERS

- 00101 PROJECT INFORMATION PAGE
- 00102 TABLE OF CONTENTS
- 00103 PROJECT NARRATIVE
- 00104 LIST OF DRAWINGS
- 00105 LOCATION MAP
- 00106 WORK RULES
- 00107 NOISE ORDINANCE
- 00108 VENDOR REGISTRATION

BIDDING REQUIREMENTS AND FORMS

AIA Document A101® – 2017. Copyright © 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1967, 1974, 1977, 1987, 1991, 1997, 2007 and 2017 by The American Institute of Architects. All rights reserved. The "American Institute of Architects," "AIA," the AIA Logo, "A101," and "AIA Contract Documents" are registered trademarks and may not be used without permission. This draft was produced by AIA software at 15:06:40 ET on 07/09/2020 under Order No 4871828818 which expires on 01/29/2021, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents' Terms of Service. To report copyright violations, e-mail copyright@aia.org.

User Notes:

(3B9ADA50)

- 00201 INVITATION TO BID
- 00202 INSTRUCTIONS TO BIDDERS - AIA DOCUMENT A701 - 1997
- 00203 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS
- 00204 BID FORMS
- 00205 SAMPLE AGREEMENT FORM
- LABOR REQUIREMENTS**
- 00303 CONTRACT LABOR RATES
- GENERAL CONDITIONS**
- 00401 GENERAL CONDITIONS - AIA DOCUMENT A201 - 2007
- 00402 SUPPLEMENTARY GENERAL CONDITIONS

7 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

Contractor's Bid Response attached herein

This Agreement entered into as of the day and year first written above.

OWNER (Signature)

Peter Privitera, Purchasing Agent

(Printed name and title)

CONTRACTOR (Signature)

(Printed name and title)

AIA® Document A201® – 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Air Handling Unit Replacement at Sedgwick Middle School Bid# 210001
128 Sedgwick Road
West Hartford, CT

THE OWNER:

(Name, legal status and address)

Town of West Hartford
50 South Main Street
West Hartford, CT 06107

THE ARCHITECT:

(Name, legal status and address)

Lucian Dragulski, PE
Bemis Associates LLC
185 Main Street
Farmington, CT 06032

TABLE OF ARTICLES

- | | |
|----|--|
| 1 | GENERAL PROVISIONS |
| 2 | OWNER |
| 3 | CONTRACTOR |
| 4 | ARCHITECT |
| 5 | SUBCONTRACTORS |
| 6 | CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS |
| 7 | CHANGES IN THE WORK |
| 8 | TIME |
| 9 | PAYMENTS AND COMPLETION |
| 10 | PROTECTION OF PERSONS AND PROPERTY |
| 11 | INSURANCE AND BONDS |
| 12 | UNCOVERING AND CORRECTION OF WORK |
| 13 | MISCELLANEOUS PROVISIONS |
| 14 | TERMINATION OR SUSPENSION OF THE CONTRACT |
| 15 | CLAIMS AND DISPUTES |

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.

INDEX

(Topics and numbers in bold are section headings.)

Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, **12.3**

Access to Work

3.16, 6.2.1, **12.1**

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,

10.2.8, 13.4.2, 13.7, 14.1, 15.2

Addenda

1.1.1, 3.11

Additional Costs, Claims for

3.7.4, 3.7.5, 6.1.1, 7.3.7.5, 10.3, 15.1.4

Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.5**

Additional Insured

11.1.4

Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.5**

Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

Allowances

3.8, 7.3.8

All-risk Insurance

11.3.1, 11.3.1.1

Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.6.3, 9.7, 9.10, 11.1.3

Approvals

2.1.1, 2.2.2, 2.4, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10,

4.2.7, 9.3.2, 13.5.1

Arbitration

8.3.1, 11.3.10, 13.1, 15.3.2, **15.4**

ARCHITECT

4

Architect, Definition of

4.1.1

Architect, Extent of Authority

2.4, 3.12.7, 4.1, 4.2, 5.2, 6.3, 7.1.2, 7.3.7, 7.4, 9.2,
9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1,
13.5.1, 13.5.2, 14.2.2, 14.2.4, 15.1.3, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3,
4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2,
9.5.3, 9.6.4, 15.1.3, 15.2

Architect's Additional Services and Expenses

2.4, 11.3.1.1, 12.2.1, 13.5.2, 13.5.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 4.2, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.4, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3,
7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1,
13.5.2, 15.2, 15.3

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.5

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.5.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5,
3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18,
4.1.2, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,
9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.4.2, 13.5, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3.7

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

Award of Subcontracts and Other Contracts for Portions of the Work

5.2

Basic Definitions

1.1

Bidding Requirements

1.1.1, 5.2.1, 11.4.1

Binding Dispute Resolution

9.7, 11.3.9, 11.3.10, 13.1, 15.2.5, 15.2.6.1, 15.3.1,
15.3.2, 15.4.1

Boiler and Machinery Insurance

11.3.2

Bonds, Lien

7.3.7.4, 9.10.2, 9.10.3

Bonds, Performance, and Payment

7.3.7.4, 9.6.7, 9.10.3, 11.3.9, **11.4**

Building Permit

3.7.1

Init.

AIA Document A201® – 2007. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997 and 2007 by The American Institute of Architects. All rights reserved. The "American Institute of Architects," "AIA," the AIA Logo, "A201," and "AIA Contract Documents" are registered trademarks and may not be used without permission. This document was produced by AIA software at 15:34:59 ET on 07/09/2020 under Order No.4871828818 which expires on 01/29/2021, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail copyright@aia.org.

User Notes:

(795112022)

Capitalization

1.3

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.3

Certificates of Inspection, Testing or Approval

13.5.4

Certificates of Insurance

9.10.2, 11.1.3

Change Orders

1.1.1, 2.4, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, 7.2, 7.3.2, 7.3.6, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2, 15.1.3

Change Orders, Definition of

7.2.1

CHANGES IN THE WORK

2.2.1, 3.11, 4.2.8, 7, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.3.9

Claims, Definition of

15.1.1

CLAIMS AND DISPUTES

3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, 15, 15.4

Claims and Timely Assertion of Claims

15.4.1

Claims for Additional Cost

3.2.4, 3.7.4, 6.1.1, 7.3.9, 10.3.2, 15.1.4

Claims for Additional Time

3.2.4, 3.7.4, 6.1.1, 8.3.2, 10.3.2, 15.1.5

Concealed or Unknown Conditions, Claims for

3.7.4

Claims for Damages

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6

Claims Subject to Arbitration

15.3.1, 15.4.1

Cleaning Up

3.15, 6.3

Commencement of the Work, Conditions Relating to

2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.3.1, 11.3.6, 11.4.1, 15.1.4

Commencement of the Work, Definition of

8.1.2

Communications Facilitating Contract

Administration

3.9.1, 4.2.4

Completion, Conditions Relating to

3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 13.7, 14.1.2

COMPLETION, PAYMENTS AND

9

Completion, Substantial

4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7

Compliance with Laws

1.6, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3

Concealed or Unknown Conditions

3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract

1.1.1, 6.1.1, 6.1.4

Consent, Written

3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.3.1, 13.2, 13.4.2, 15.4.4.2

Consolidation or Joinder

15.4.4

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

1.1.4, 6

Construction Change Directive, Definition of

7.3.1

Construction Change Directives

1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, 7.3, 9.3.1.1

Construction Schedules, Contractor's

3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Contingent Assignment of Subcontracts

5.4, 14.2.2.2

Continuing Contract Performance

15.1.3

Contract, Definition of

1.1.2

CONTRACT, TERMINATION OR SUSPENSION OF THE

5.4.1.1, 11.3.9, 14

Contract Administration

3.1.3, 4, 9.4, 9.5

Contract Award and Execution, Conditions Relating to

3.7.1, 3.10, 5.2, 6.1, 11.1.3, 11.3.6, 11.4.1

Contract Documents, Copies Furnished and Use of

1.5.2, 2.2.5, 5.3

Contract Documents, Definition of

1.1.1

Contract Sum

3.7.4, 3.8, 5.2.3, 7.2, 7.3, 7.4, 9.1, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.3.1, 14.2.4, 14.3.2, 15.1.4, 15.2.5

Contract Sum, Definition of

9.1

Contract Time

3.7.4, 3.7.5, 3.10.2, 5.2.3, 7.2.1.3, 7.3.1, 7.3.5, 7.4, 8.1.1, 8.2.1, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 14.3.2, 15.1.5.1, 15.2.5

Contract Time, Definition of

8.1.1

CONTRACTOR

3

Contractor, Definition of

3.1, 6.1.2

init.

Contractor's Construction Schedules
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2
Contractor's Employees
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3,
11.1.1, 11.3.7, 14.1, 14.2.1.1
Contractor's Liability Insurance
11.1
Contractor's Relationship with Separate Contractors and Owner's Forces
3.12.5, 3.14.2, 4.2.4, 6, 11.3.7, 12.1.2, 12.2.4
Contractor's Relationship with Subcontractors
1.2.2, 3.3.2, 3.18.1, 3.18.2, 5, 9.6.2, 9.6.7, 9.10.2,
11.3.1.2, 11.3.7, 11.3.8
Contractor's Relationship with the Architect
1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5,
3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.3, 4.2, 5.2, 6.2.2,
7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3,
11.3.7, 12, 13.5, 15.1.2, 15.2.1
Contractor's Representations
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2
Contractor's Responsibility for Those Performing the Work
3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8
Contractor's Review of Contract Documents
3.2
Contractor's Right to Stop the Work
9.7
Contractor's Right to Terminate the Contract
14.1, 15.1.6
Contractor's Submittals
3.10, 3.11, 3.12.4, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2,
9.8.3, 9.9.1, 9.10.2, 9.10.3, 11.1.3, 11.4.2
Contractor's Superintendent
3.9, 10.2.6
Contractor's Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,
7.3.5, 7.3.7, 8.2, 10, 12, 14, 15.1.3
Contractual Liability Insurance
11.1.1.8, 11.2
Coordination and Correlation
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1
Copies Furnished of Drawings and Specifications
1.5, 2.2.5, 3.11
Copyrights
1.5, 3.17
Correction of Work
2.3, 2.4, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, 12.2
Correlation and Intent of the Contract Documents
1.2
Cost, Definition of
7.3.7
Costs
2.4, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3,
7.3.3.3, 7.3.7, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.3,
12.1.2, 12.2.1, 12.2.4, 13.5, 14

Cutting and Patching
3.14, 6.2.5
Damage to Construction of Owner or Separate Contractors
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 11.1.1, 11.3,
12.2.4
Damage to the Work
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 11.3.1, 12.2.4
Damages, Claims for
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1,
11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6
Damages for Delay
6.1.1, 8.3.3, 9.5.1.6, 9.7, 10.3.2
Date of Commencement of the Work, Definition of
8.1.2
Date of Substantial Completion, Definition of
8.1.3
Day, Definition of
8.1.4
Decisions of the Architect
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 15.2, 6.3,
7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1,
13.5.2, 14.2.2, 14.2.4, 15.1, 15.2
Decisions to Withhold Certification
9.4.1, 9.5, 9.7, 14.1.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of
2.3, 2.4, 3.5, 4.2.6, 6.2.5, 9.5.1, 9.5.2, 9.6.6, 9.8.2,
9.9.3, 9.10.4, 12.2.1
Definitions
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1,
15.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1
Delays and Extensions of Time
3.2, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7,
10.3.2, 10.4, 14.3.2, 15.1.5, 15.2.5
Disputes
6.3, 7.3.9, 15.1, 15.2
Documents and Samples at the Site
3.11
Drawings, Definition of
1.1.5
Drawings and Specifications, Use and Ownership of
3.11
Effective Date of Insurance
8.2.2, 11.1.2
Emergencies
10.4, 14.1.1.2, 15.1.4
Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,
10.3.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1
Equipment, Labor, Materials or
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,
4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3,
9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Init.

Execution and Progress of the Work
 1.1.3, 1.2.1, 1.2.2, 2.2.3, 2.2.5, 3.1, 3.3.1, 3.4.1, 3.5,
 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.5, 8.2,
 9.5.1, 9.9.1, 10.2, 10.3, 12.2, 14.2, 14.3.1, 15.1.3
 Extensions of Time
 3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2,
 10.4, 14.3, 15.1.5, 15.2.5
Failure of Payment
 9.5.1.3, 9.7, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2
 Faulty Work
 (See Defective or Nonconforming Work)
Final Completion and Final Payment
 4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.3.1, 11.3.5,
 12.3, 14.2.4, 14.4.3
 Financial Arrangements, Owner's
 2.2.1, 13.2.2, 14.1.1.4
 Fire and Extended Coverage Insurance
 11.3.1.1
GENERAL PROVISIONS
1
Governing Law
13.1
 Guarantees (See Warranty)
Hazardous Materials
 10.2.4, 10.3
 Identification of Subcontractors and Suppliers
 5.2.1
Indemnification
 3.17, 3.18, 9.10.2, 10.3.3, 10.3.5, 10.3.6, 11.3.1.2,
 11.3.7
Information and Services Required of the Owner
 2.1.2, 2.2, 3.2.2, 3.12.4, 3.12.10, 6.1.3, 6.1.4, 6.2.5,
 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.4, 13.5.1,
 13.5.2, 14.1.1.4, 14.1.4, 15.1.3
Initial Decision
15.2
Initial Decision Maker, Definition of
 1.1.8
 Initial Decision Maker, Decisions
 14.2.2, 14.2.4, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
 Initial Decision Maker, Extent of Authority
 14.2.2, 14.2.4, 15.1.3, 15.2.1, 15.2.2, 15.2.3, 15.2.4,
 15.2.5
Injury or Damage to Person or Property
10.2.8, 10.4
 Inspections
 3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,
 9.9.2, 9.10.1, 12.2.1, 13.5
 Instructions to Bidders
 1.1.1
 Instructions to the Contractor
 3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.5.2
Instruments of Service, Definition of
1.1.7
 Insurance
 3.18.1, 6.1.1, 7.3.7, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 11

Insurance, Boiler and Machinery
11.3.2
Insurance, Contractor's Liability
11.1
 Insurance, Effective Date of
 8.2.2, 11.1.2
Insurance, Loss of Use
11.3.3
Insurance, Owner's Liability
11.2
Insurance, Property
 10.2.5, 11.3
 Insurance, Stored Materials
 9.3.2
INSURANCE AND BONDS
11
 Insurance Companies, Consent to Partial Occupancy
 9.9.1
 Intent of the Contract Documents
 1.2.1, 4.2.7, 4.2.12, 4.2.13, 7.4
Interest
13.6
Interpretation
 1.2.3, 1.4, 4.1.1, 5.1, 6.1.2, 15.1.1
 Interpretations, Written
 4.2.11, 4.2.12, 15.1.4
 Judgment on Final Award
 15.4.2
Labor and Materials, Equipment
 1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,
 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3,
 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
 Labor Disputes
 8.3.1
 Laws and Regulations
 1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1,
 10.2.2, 11.1.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6,
 14, 15.2.8, 15.4
 Liens
 2.1.2, 9.3.3, 9.10.2, 9.10.4, 15.2.8
 Limitations, Statutes of
 12.2.5, 13.7, 15.4.1.1
 Limitations of Liability
 2.3, 3.2.2, 3.5, 3.12.10, 3.17, 3.18.1, 4.2.6, 4.2.7,
 4.2.12, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 10.2.5, 10.3.3, 11.1.2,
 11.2, 11.3.7, 12.2.5, 13.4.2
 Limitations of Time
 2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7,
 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3,
 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 11.3.1.5,
 11.3.6, 11.3.10, 12.2, 13.5, 13.7, 14, 15
Loss of Use Insurance
11.3.3
 Material Suppliers
 1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.6, 9.10.5
Materials, Hazardous
 10.2.4, 10.3

Init.

Materials, Labor, Equipment and
1.1.3, 1.1.6, 1.5.1, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13,
3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3,
9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and
Procedures of Construction
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien
2.1.2, 15.2.8

Mediation
8.3.1, 10.3.5, 10.3.6, 15.2.1, 15.2.5, 15.2.6, 15.3,
15.4.1

Minor Changes in the Work
1.1.1, 3.12.8, 4.2.8, 7.1, 7.4

MISCELLANEOUS PROVISIONS
13

Modifications, Definition of
1.1.1
Modifications to the Contract
1.1.1, 1.1.2, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7,
10.3.2, 11.3.1

Mutual Responsibility
6.2
Nonconforming Work, Acceptance of
9.6.6, 9.9.3, 12.3
Nonconforming Work, Rejection and Correction of
2.3, 2.4, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4,
12.2.1
Notice
2.2.1, 2.3, 2.4, 3.2.4, 3.3.1, 3.7.2, 3.12.9, 5.2.1, 9.7,
9.10, 10.2.2, 11.1.3, 12.2.2.1, 13.3, 13.5.1, 13.5.2,
14.1, 14.2, 15.2.8, 15.4.1
Notice, Written
2.3, 2.4, 3.3.1, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 9.7, 9.10,
10.2.2, 10.3, 11.1.3, 11.3.6, 12.2.2.1, 13.3, 14, 15.2.8,
15.4.1
Notice of Claims
3.7.4, 10.2.8, 15.1.2, 15.4
Notice of Testing and Inspections
13.5.1, 13.5.2
Observations, Contractor's
3.2, 3.7.4
Occupancy
2.2.2, 9.6.6, 9.8, 11.3.1.5
Orders, Written
1.1.1, 2.3, 3.9.2, 7, 8.2.2, 11.3.9, 12.1, 12.2.2.1, 13.5.2,
14.3.1

OWNER
2
Owner, Definition of
2.1.1
Owner, Information and Services Required of the
2.1.2, 2.2, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2,
9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.3, 13.5.1,
13.5.2, 14.1.1.4, 14.1.4, 15.1.3

Owner's Authority
1.5, 2.1.1, 2.3, 2.4, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2,
4.1.3, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1,
7.3.1, 8.2.2, 8.3.1, 9.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1,
9.10.2, 10.3.2, 11.1.3, 11.3.3, 11.3.10, 12.2.2, 12.3,
13.2.2, 14.3, 14.4, 15.2.7
Owner's Financial Capability
2.2.1, 13.2.2, 14.1.1.4
Owner's Liability Insurance
11.2
Owner's Relationship with Subcontractors
1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2
Owner's Right to Carry Out the Work
2.4, 14.2.2
Owner's Right to Clean Up
6.3
Owner's Right to Perform Construction and to Award Separate Contracts
6.1
Owner's Right to Stop the Work
2.3
Owner's Right to Suspend the Work
14.3
Owner's Right to Terminate the Contract
14.2
Ownership and Use of Drawings, Specifications and Other Instruments of Service
1.1.1, 1.1.6, 1.1.7, 1.5, 2.2.5, 3.2.2, 3.11, 3.17, 4.2.12,
5.3
Partial Occupancy or Use
9.6.6, 9.9, 11.3.1.5
Patching, Cutting and
3.14, 6.2.5
Patents
3.17
Payment, Applications for
4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1,
14.2.3, 14.2.4, 14.4.3
Payment, Certificates for
4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1,
9.10.3, 13.7, 14.1.1.3, 14.2.4
Payment, Failure of
9.5.1.3, 9.7, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2
Payment, Final
4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.4.1, 12.3,
13.7, 14.2.4, 14.4.3
Payment Bond, Performance Bond and
7.3.7.4, 9.6.7, 9.10.3, 11.4
Payments, Progress
9.3, 9.6, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3
PAYMENTS AND COMPLETION
9
Payments to Subcontractors
5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2
PCB
10.3.1

Init.

Performance Bond and Payment Bond

7.3.7.4, 9.6.7, 9.10.3, 11.4

Permits, Fees, Notices and Compliance with Laws

2.2.2, 3.7, 3.13, 7.3.7.4, 10.2.2

PERSONS AND PROPERTY, PROTECTION OF
10

Polychlorinated Biphenyl

10.3.1

Product Data, Definition of

3.12.2

Product Data and Samples, Shop Drawings

3.11, 3.12, 4.2.7

Progress and Completion

4.2.2, 8.2, 9.8, 9.9.1, 14.1.4, 15.1.3

Progress Payments

9.3, 9.6, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3

Project, Definition of

1.1.4

Project Representatives

4.2.10

Property Insurance

10.2.5, 11.3

PROTECTION OF PERSONS AND PROPERTY
10

Regulations and Laws

1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1, 11.4, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4

Rejection of Work

3.5, 4.2.6, 12.2.1

Releases and Waivers of Liens

9.10.2

Representations

3.2.1, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.8.2, 9.10.1

Representatives

2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.2, 4.2.10, 5.1.1, 5.1.2, 13.2.1

Responsibility for Those Performing the Work

3.3.2, 3.18, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10

Retainage

9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3

Review of Contract Documents and Field

Conditions by Contractor

3.2, 3.12.7, 6.1.3

Review of Contractor's Submittals by Owner and Architect

3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2

Review of Shop Drawings, Product Data and Samples by Contractor

3.12

Rights and Remedies

1.1.2, 2.3, 2.4, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, 13.4, 14, 15.4

Royalties, Patents and Copyrights

3.17

Rules and Notices for Arbitration

15.4.1

Safety of Persons and Property

10.2, 10.4

Safety Precautions and Programs

3.3.1, 4.2.2, 4.2.7, 5.3, 10.1, 10.2, 10.4

Samples, Definition of

3.12.3

Samples, Shop Drawings, Product Data and

3.11, 3.12, 4.2.7

Samples at the Site, Documents and

3.11

Schedule of Values

9.2, 9.3.1

Schedules, Construction

3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Separate Contracts and Contractors

1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2

Shop Drawings, Definition of

3.12.1

Shop Drawings, Product Data and Samples

3.11, 3.12, 4.2.7

Site, Use of

3.13, 6.1.1, 6.2.1

Site Inspections

3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.4.2, 9.10.1, 13.5

Site Visits, Architect's

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5

Special Inspections and Testing

4.2.6, 12.2.1, 13.5

Specifications, Definition of

1.1.6

Specifications

1.1.1, 1.1.6, 1.2.2, 1.5, 3.11, 3.12.10, 3.17, 4.2.14

Statute of Limitations

13.7, 15.4.1.1

Stopping the Work

2.3, 9.7, 10.3, 14.1

Stored Materials

6.2.1, 9.3.2, 10.2.1.2, 10.2.4

Subcontractor, Definition of

5.1.1

SUBCONTRACTORS

5

Subcontractors, Work by

1.2.2, 3.3.2, 3.12.1, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7

Subcontractual Relations

5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1

Submittals

3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.7, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3, 11.1.3

Submittal Schedule

3.10.2, 3.12.5, 4.2.7

Subrogation, Waivers of

6.1.1, 11.3.7

Init.

Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7

Substantial Completion, Definition of
9.8.1

Substitution of Subcontractors
5.2.3, 5.2.4

Substitution of Architect
4.1.3

Substitutions of Materials
3.4.2, 3.5, 7.3.8

Sub-subcontractor, Definition of
5.1.2

Subsurface Conditions
3.7.4

Successors and Assigns
13.2

Superintendent
3.9, 10.2.6

Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.7, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.3

Surety
5.4.1.2, 9.8.5, 9.10.2, 9.10.3, 14.2.2, 15.2.7

Surety, Consent of
9.10.2, 9.10.3

Surveys
2.2.3

Suspension by the Owner for Convenience
14.3

Suspension of the Work
5.4.2, 14.3

Suspension or Termination of the Contract
5.4.1.1, 14

Taxes
3.6, 3.8.2.1, 7.3.7.4

Termination by the Contractor
14.1, 15.1.6

Termination by the Owner for Cause
5.4.1.1, 14.2, 15.1.6

Termination by the Owner for Convenience
14.4

Termination of the Architect
4.1.3

Termination of the Contractor
14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT
14

Tests and Inspections
3.1.3, 3.3.3, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 11.4.1, 12.2.1, 13.5

TIME
8

Time, Delays and Extensions of
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.5, 15.2.5

Time Limits
2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 12.2, 13.5, 13.7, 14, 15.1.2, 15.4

Time Limits on Claims
3.7.4, 10.2.8, 13.7, 15.1.2

Title to Work
9.3.2, 9.3.3

Transmission of Data in Digital Form
1.6

UNCOVERING AND CORRECTION OF WORK
12

Uncovering of Work
12.1

Unforeseen Conditions, Concealed or Unknown
3.7.4, 8.3.1, 10.3

Unit Prices
7.3.3.2, 7.3.4

Use of Documents
1.1.1, 1.5, 2.2.5, 3.12.6, 5.3

Use of Site
3.13, 6.1.1, 6.2.1

Values, Schedule of
9.2, 9.3.1

Waiver of Claims by the Architect
13.4.2

Waiver of Claims by the Contractor
9.10.5, 13.4.2, 15.1.6

Waiver of Claims by the Owner
9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.4.2, 14.2.4, 15.1.6

Waiver of Consequential Damages
14.2.4, 15.1.6

Waiver of Liens
9.10.2, 9.10.4

Waivers of Subrogation
6.1.1, 11.3.7

Warranty
3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.4, 12.2.2, 13.7

Weather Delays
15.1.5.2

Work, Definition of
1.1.3

Written Consent
1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.4.1, 13.2, 13.4.2, 15.4.4.2

Written Interpretations
4.2.11, 4.2.12

Written Notice
2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 8.2.2, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 12.2.2, 12.2.4, 13.3, 14, 15.4.1

Written Orders
1.1.1, 2.3, 3.9, 7, 8.2.2, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 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 Agreement, Conditions of the Contract (General, Supplementary and other 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. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 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 the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part 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.

§ 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.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 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.

Init.

§ 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.

§ 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 Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. 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.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 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 Agreement or the Contract Documents.

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. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the

Init.

portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 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.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 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.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, 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.

§ 2.4 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 fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

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 shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 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 in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

Init.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before 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 2.2.3, 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 any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect 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.

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

§ 3.2.4 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 make 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. 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.

§ 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, unless the Contract Documents give other specific instructions concerning these matters. 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 written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 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.

§ 3.4 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.

Init.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 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.

§ 3.4.3 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 employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

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 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.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 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 and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 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.

§ 3.7.4 **Concealed or Unknown Conditions.** If 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 shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 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 from those indicated in the Contract Documents 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. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 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

Init.

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. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 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; 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.

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

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. 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 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be 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, 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.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required

Init.

submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 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 the way by which 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.

§ 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 informed the Architect in writing of such deviation at the time of submittal and (1) the Architect 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 written 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. 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 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

Init.

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 all 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. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 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 and patching shall be restored to the condition existing prior to the cutting, fitting and 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 such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or 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 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 Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect 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 such 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 a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall 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 negligent acts or omissions of the Contractor, a 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

Init.

party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a 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 or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 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.

§ 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.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 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 the Work, when fully completed, 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, except as provided in Section 3.3.1.

§ 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 report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) 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 FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 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 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed.

Init.

However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 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, unless otherwise specifically stated by the Architect, 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 Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; 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.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 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 or otherwise with reasonable promptness.

§ 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 Architect's decisions 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 or otherwise with reasonable promptness. 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 subcontractors of a separate contractor.

Init.

§ 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. 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 or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-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. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 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, the Contract Sum and Contract Time 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 or Contract Time 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 previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, 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, which the Contractor, by these 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 agreement 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 for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; 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 agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

Init.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

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 Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 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 Agreement.

§ 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 other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. 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, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, 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 report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report 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, except as to defects not then reasonably discoverable.

§ 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. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors 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.

§ 6.3 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 Architect 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 requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, 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 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.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the 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.

§ 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 an 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; or
- .4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect 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.

Init.

§ 7.3.6 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. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment 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, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, 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 Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect 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.

init.

§ 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 Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 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 an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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 the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 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 supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon

Init.

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.

§ 9.3.3 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, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to 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, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part 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 comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. 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. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. 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 material 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 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. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect 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 security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 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 material or equipment suppliers to whom the

Init.

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 Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 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 material and equipment suppliers 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 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, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment 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 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven 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 additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 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 the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list 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 list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, 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, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list 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 such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 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 as required under Section 11.3.1.5 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 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 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 written 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 and, 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 terms and conditions of 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 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract

Init.

Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, 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. 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. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, 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 or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed 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 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 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material 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

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on 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 or the Contractor's Subcontractors or Sub-subcontractors; 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.

§ 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 safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall 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.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 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 caused in

Init.

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, except damage or loss 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 to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify 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. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such 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 material or substance has been rendered harmless, 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 and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, 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 in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, 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), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

Init.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance 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.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting 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.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located 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 or by a Subcontractor or by 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 insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 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 by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. 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 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. 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.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional

init.

insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. 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.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

Init.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

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, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, 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 covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

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 change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect 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 and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, 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 9.9.1, or by terms of an 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 after receipt of written 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 and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 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, whether completed or partially completed, of the Owner or separate contractors 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 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

Init.

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 governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives 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 such 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 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 such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 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.

§ 13.4.2 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 there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. 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 (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 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 13.5.1, 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 13.5.3, shall be at the Owner's expense.

Init.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 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 services and expenses shall be at the Contractor's expense.

§ 13.5.4 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.

§ 13.5.5 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.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

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 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, 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;
- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor 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 additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

Init.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly 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 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, 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 days' written 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.

§ 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 costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, 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 as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. 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, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .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.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

Init.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, 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.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and 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. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 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.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in 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, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

Init.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten 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, 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. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten 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.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 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 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

GENERAL

A. RELATED DOCUMENTS

AIA Document A 201 "General Conditions of the Contract for Construction", (Sixteenth Edition, Copyright 2007, The American Institute of Architects, Articles 1 through 15) and the Town of West Hartford's Supplementary General Conditions (Section 00402 Articles 1-15) are bound herein, and are hereby made a part of the Contract Bidding Documents and shall apply to all Contractors and Subcontractors.

B. AMENDMENTS TO THE GENERAL CONDITIONS

- a. The Supplementary General Conditions include:
 1. Any and all revisions to, deletions from, replacement of, and additions to portions of the AIA General Conditions, Articles 1 through 15.
 2. Such additional articles beyond Article 15 as may be included herein.
- b. Certain articles of the AIA General Conditions, or portions thereof, are revised by, are deleted, are replaced by, or are supplemented by the requirements of the following Supplementary Conditions. Such revisions, deletions, replacements, or additions shall take precedence over the AIA General Conditions.
- c. Where any such Article is revised, deleted, or replaced, the provisions of such Article not so specifically revised, deleted or replaced shall remain in effect.
- d. The following paragraphs are numbered in sequence corresponding to those of the General Conditions. Revised paragraphs and clauses have the same numerical designations occurring in the General Conditions. Additions to paragraphs, subparagraphs and clauses are numbered in sequence.

ARTICLE 1 – GENERAL PROVISIONS

- 1.1.1 Delete the word "not" on line 7 so that the sentence begins "The Contract Documents do include."
- 1.1.3 Add the following words after the word "obligations" in line 3:

or to be provided by Subcontractors, material suppliers, or any other entity for whom the Contractor is responsible under or pursuant to the Contract Documents.
- 1.2.4 Add new subparagraph 1.2.4 as follows:

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

In case of any conflict or inconsistency among the Contract Documents, the Architect's decision shall govern. If there is any inconsistency in the Drawings, or between the Drawings and the Specifications, unless otherwise ordered in writing by the Architect or the Owner, the Contractor shall provide the better quality of, or the greater quantity of, work or materials.

1.2.5 Add new subparagraph 1.2.5 as follows:

Where a typical or representative detail is shown on the Drawings, such detail shall constitute the standard of workmanship and materials throughout corresponding portions of the Work. Where necessary, the Contractor shall adopt such detail for use in said corresponding portions of the Work in a manner that is satisfactory to the Architect.

1.5.1 Add the following after the first sentence:

Such drawings, specifications, other documents and copies thereof are and shall remain the joint property of the Architect and Owner.

ARTICLE 2 - OWNER

2.2.1 Delete third and forth sentences.

2.2.2 Add the following at the end of 2.2.2 "unless otherwise provided in the contract documents."

2.2.3 Delete the words "and utility locations" on line 1.

2.2.4 Delete the second sentence of 2.2.4.

2.2.5 Delete subparagraph 2.2.5 in its' entirety and substitute with the following:

The Contractor will be furnished up to fifteen (15) sets of the Contract Bidding Documents at no charge.

2.3 Change subparagraph 2.3 as follows:

Delete the word "repeatedly" in line 2.
Add the following at the end of 2.3:

The Owner's right to order the Contractor to stop the Work shall not relieve the Contractor of any of his responsibilities and obligations under or pursuant to the Contract Documents.

2.5 Add new paragraph 2.5 as follows:

2.5 - Additional Rights

The rights stated in Article 2 shall be in addition to and shall not be in limitation of any other rights of the Owner granted in the Contract Documents or at law or in equity.

ARTICLE 3 - CONTRACTOR

3.2.2 Delete subparagraph 3.2.2 in its' entirety and substitute with the following:

The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the Owner pursuant to subparagraph 2.2.3 and 3.2.3 and shall at once report to the Architect errors, inconsistencies or omissions discovered, or any variance from applicable laws, statutes, ordinances, building codes, rules, regulations or any lawful orders of any governmental body, or public or quasi-public authority. The Contractor shall not be liable to the Owner or Architect for damage resulting from errors, inconsistencies or omissions in the Contract Documents unless the Contractor recognized or should have recognized such error, inconsistency or omission and failed to report it to the Architect. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the Architect, the Contractor shall assume responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

3.2.3 Delete subparagraph 3.2.3 in its' entirety and substitute with the following:

The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Architect at once. After reporting to the Architect any error, inconsistency or omission the Contractor may discover in the Contract Documents, the Contractor shall not proceed with any work so affected without the Architect's written modifications to the Contract Documents.

3.2.4 Delete subparagraph 3.2.4 in its' entirety and substitute with the following:

The Contractor shall fully comply, or assure full compliance by Subcontractors or others under his direction, with Connecticut General Statutes Section 16-345, et seq. ("Call Before You Dig") and the regulations pertaining thereto. The Contractor shall be responsible to make certain of the exact location of the public and private mains, ducts, poles and utility services prior to excavation. The utility mains, ducts,

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

poles and services in the construction area where referred to on the Project plans or elsewhere in the Contract Documents are at the approximate locations furnished by various Utilities concerned. These locations are subject to possible errors in the source of the information and also errors in transcription. Connecticut General Statutes Section 16-349, as amended, makes it mandatory to notify Utilities of any proposed excavation, discharge of explosives, or demolition within the purview of Connecticut General Statutes Section 16-345, et seq. The Contractor shall call 1-800-922-4455 (toll free), 7:00 A.M. to 6:00 P.M., Monday through Friday, at least forty-eight hours prior to beginning the excavation, discharge of explosives, or demolition. The Owner shall be notified in a similar manner. This "Call Before You Dig" service is provided by the Utility companies. Once the call is made, it is the utilities' responsibility to analyze the site and identify and mark their underground facilities. Privately or Town-owned utility mains, ducts, poles and services may be located in the construction area and the Contractor shall contact the Architect to verify their existence and location.

- 3.3.1 Delete the last sentence of subparagraph 3.3.1 and add the following:

Should the Contractor fail to perform his work to the satisfaction of the Architect and Owner, the Architect and Owner have the right to order that all work must stop until the work is rectified.

- 3.3.4 Add new subparagraph 3.3.4 as follows:

The Contractor will be required to attend weekly Project Meetings from the time the Agreement is executed until Final Acceptance.

- 3.4.4 Add new subparagraph 3.4.4 as follows:

The Contractor is encouraged to use local labor where feasible, but not when it is at the expense of poor workmanship and/or higher costs. The Contractor shall not discriminate or permit discrimination in employment or in the award of sub-contracts or in the selection of materials suppliers, in any manner prohibited by the laws and regulations of the United States, the State of Connecticut or the Town of West Hartford.

- 3.5 Add the words "or Owner" after the word "Architect" in line 8.

- 3.6 Delete subparagraph 3.6 in its' entirety and substitute the following:

No amount shall be included in the Bid for Connecticut Sales or Service Taxes or for Federal Excise Tax on materials or supplies purchased for this project. If applicable, the owner shall provide tax exempt documentation for the contractor's records.

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

3.7.2 Add the following sentence: A copy of the State license for general and major Subcontractors issued in accordance with C.G.S Section 20-341gg shall be furnished to the Owner upon request.

3.7.4 Add the following before the word "If" on line 1: "Except as in regards to claims relating to hazardous materials which are discussed in Article 3.7.8.."

Line 6, place a period after disturbed and delete rest of sentence.

If the Contractor performs work contrary to laws, statutes, ordinances, building codes, and rules and regulations, the Contractor shall assume responsibility for such work and shall bear the costs attributable to correction.

3.7.6 Add new subparagraph 3.7.6 as follows:

The requirements of subparagraphs preceding do not waive the Contractor's responsibility of complying with the requirements of the contract documents, when such regulations and requirements exceed those of any laws, ordinances, rules, regulations, and orders of any public authority bearing on the work.

3.7.7 Add new subparagraph 3.7.7 as follows:

The Town of West Hartford Building Permit Fee will be waived, however, the General Contractor must apply for the Building Permit, and in all other ways comply with procedures of the office of the Building Official for the Town of West Hartford.

3.7.8 Add new subparagraph 3.7.8 as follows:

The Owner and Architect shall bear no responsibility to the Contractor, or sub-contractor(s) for any delay damages claimed to have resulted from activities claimed to relate to the detection, abatement, or handling of hazardous materials known to exist or subsequently discovered upon the premises. The sole remedy of the Contractor under such circumstances shall be an appropriate extension of contract completion time. No damages shall be paid by the Architect or Owner, their agents, servants or independent Contractors as a result of any such claim.

3.12.10 Delete the word "properly" in line 9 and substitute the word "Connecticut".

3.17 Delete subparagraph 3.17 and substitute with the following:

The Contractor shall pay all royalties and license fees. The Contractor shall defend all suits or claims for infringement of any copyrights and patent rights and shall hold the Owner harmless from loss (including, but not limited to, attorneys' fees and any litigation expenses) unless a particular design, process or the product of a particular

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

manufacturer or manufacturers is specified in the Contract Documents or where copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect; provided, however, that if the Contractor has reason to believe that the design, process or product specified is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless the Contractor promptly gives such information to the Architect and Owner.

- 3.18.1 Delete subparagraph 3.18.1 in its entirety and replace the original language with the attached Indemnification and Insurance Exhibit which shall be fully incorporated by reference into this Agreement:

ARTICLE 4 - ARCHITECT

- 4.1.2 Delete subparagraph 4.1.2 in its' entirety and substitute the following:

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 agreement of the Owner and Architect. The Contractor shall be notified of such restriction, modification or extension in writing.

- 4.1.3 Delete the words "as to whom the Contractor makes no reasonable objection and".

ARTICLE 5 - SUB-CONTRACTORS

- 5.2.1 Delete the word "after" on the second line and substitute with the words "prior to" award.

- 5.2.3 Delete subparagraph 5.2.3 in its entirety and substitute the following:

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 no suitable substitute is agreed upon, the Owner will allow the Contractor to withdraw its bid without penalty.

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

- 6.1.1 Add the word "unreasonable" before the word "delay" in the last sentence, line 4.

- 6.1.4 Delete subparagraph 6.1.4 in its' entirety.

- 6.2.3 Delete the second sentence of subparagraph 6.2.3.

6.2.4 Delete the word "wrongfully" on line 1.

ARTICLE 7 - CHANGES IN THE WORK

7.3.3 Delete subparagraph 7.3.3.1 - 7.3.3.4 and substitute with the following:

- .1 Unit prices stated in the Contract Documents or subsequently agreed upon.
- .2 In the absence of unit prices, the mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation, to be determined as follows:
 - A. The cost of labor performed and material used by the Contractor with his own forces.
 - B. The cost of Worker's Compensation, Federal Social Security, and Connecticut Unemployment Compensation at established rates, actual additional cost of payment and performance bonds.
 - C. Actual cost of rental rates for equipment (exclusive of hand tools) employed and used directly on the work.
 - D. Fifteen percent (15%) of (A), (B), and (C) above mentioned for overhead, superintendence and profit. However, if the work to be performed results in a credit to the Owner, no percentage of overhead and profit will apply.
 - E. On work to be performed by a Subcontractor, the Contractor's allowance, for overhead superintendence and profit, is to be ten percent (10%) applied to total cost of Subcontractor's work, including his allowance as per paragraph G.
 - F. On any changes involving the Contractor, Subcontractor or any Contractor of theirs, their total cost and/or omissions shall be combined as one before the application of the percentage allowed for the Contractor's overhead, superintendence and profit in accordance with paragraph E above.
 - G. On work to be performed by a Subcontractor, the Subcontractor's allowance is to be fifteen percent (15%) for his overhead, superintendence and profit applied to paragraphs A, B, and C.

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

H. The Contractor, when performing the work under A, B and C above shall, when requested, promptly furnish in a form satisfactory to the Owner, itemized statements of the cost of the work so ordered, including but not limited to, certified payrolls and copies of accounts, bills and vouchers to substantiate the above estimates.

7.3.4 Delete the word "shall" in line 4 and substitute the word "may".

7.3.7 Delete subparagraph 7.3.7 and substitute with the following:

If the Contractor does not respond promptly or disagrees with the method of adjustment in the Contract Sum, the method and adjustment shall be determined by the Architect in accordance with subparagraph 7.3.3. Under subparagraph 7.3.3 the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data.

7.3.8 Add the following sentence at the beginning of subparagraph 7.3.8:

"Pending final determination of cost to the Owner, amounts not in dispute may be included in Application for Payment."

7.3.9 Delete subparagraph 7.3.9 in its' entirety and substitute the following:

"If the Owner and Contractor do not agree with the adjustment in Contract Time or the method for determining it, the adjustment or the method shall be referred to the Architect for determination."

ARTICLE 8 - TIME

8.2.1 Delete second sentence only and change to read as follows:

By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work and that he is capable of properly completing the Work within the Contract Time.

8.3.1 Delete the words "and arbitration" on line 4 and substitute with the words "or resolution of claims or disputes".

ARTICLE 9 – PAYMENTS AND COMPLETION

9.2 Add the words "and the Owner" after the word Architect on line 2 and add the words "or the Owner" after the word Architect on line 4.

9.2.1 Add subparagraph 9.2.1 as follows:

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

The Schedule of Values to be submitted by the Contractor, will include, as a minimum, a separate line item for each Division of the Specifications. Any allowances called for in the Drawings and Specifications will be shown as a separate line item. Additional items to be listed may be required by the Architect.

9.3.1 Delete subparagraph 9.3.1 in its' entirety and substitute with the following:

Not later than the first day of each calendar month, the Contractor shall submit to the Architect an itemized Application for Payment for work performed during the previous month, notarized, supported by such data substantiating the Contractor's

right to payment as the Owner or the Architect may require, and reflecting retainage, if any, as provided elsewhere in the Contract Documents.

9.3.1.1 Delete 9.3.1.1 in its' entirety and substitute with the following:

In order to expedite monthly payments during the course of the project, the Contractor shall, no later than the first day of the month, review with the Architect and Owner a preliminary draft of the Application for Payment to assure agreement with the Contractor before final copies of the Application are typed and formally submitted. The Architect shall then review the Contractor's formal Application for Payment and certify in writing in accordance with Section 9.4, the total value of work done, including an allowance for the value of materials delivered and suitably stored at the site to the time of such estimate. The Owner shall retain five (5) percent of such estimated value until a maximum of five (5) percent of the Agreement sum has been retained, said retainage to be held by the Owner as part security for the fulfillment of the Agreement by the Contractor. Final payment, including the retainage, shall be due thirty (30) days after final completion of the work, provided the work be then fully completed and the Agreement fully performed.

9.3.3 Delete subparagraph 9.3.3 in its' entirety and substitute with the following:

The Contractor warrants that title to all work covered by an Application for Payment, except materials and equipment suitably stored on or off the site, will pass to the Owner no later than the time of payment. However, title to materials and equipment suitably stored on or off site shall not pass to the Owner until such time as said materials and equipment are properly installed by the Contractor even though payment for such materials and equipment may have been previously effected. 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, material suppliers, or other persons or entities making a claim by reason of having provided labor,

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

materials and equipment relating to the Work. This provision may not be explained, supplemented, or modified by a course of dealing, a usage of trade, a course of performance or other interpretation that may arise out of the commercial context in which this provision is used.

9.4.1 Delete subparagraph 9.4.1 in its' entirety and substitute with the following:

The Architect, will, not later than the seventh (7th) day of each calendar month, either issue and deliver to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determined is properly due, or notify the Contractor and Owner in writing the Architect's reasons for withholding a Certificate as provided in sub-paragraph 9.5.1.

9.4.3 Add new subparagraph 9.4.3 as follows:

If the Application for Payment discloses any problems, the Architect shall immediately bring such problems to the Owner's attention.

9.5.1 Delete the word "reasonably" in line 1; delete the words "in the Architect's opinion" in lines 2 and 8; delete the word "repeated" in sub-subparagraph 9.5.1.7.

9.5.2 Add the following to subparagraph 9.5.2:

The Owner shall not be deemed in default by reason of withholding payment while any of the above grounds remain uncured as stated in paragraph 9.5.1.

9.5.4 Add new subparagraph 9.5.4 as follows:

No interest is to be allowed or paid by the Owner upon any monies retained under the provisions of this Contract.

9.6.1 Delete subparagraph 9.6.1 in its' entirety and substitute with the following:

After the Architect has issued a Certificate for Payments, the Owner shall make payment to the Contractor not later than the first Friday after the 15th day of the calendar month during which the Application has been submitted. Delays in submitting the application for payment in accordance with subparagraph 9.3.1 above will result in a corresponding delay in payment.

9.7 Delete the word "seven" on lines 1, 2 and 4 and replace with the word "fourteen" on both lines. Delete the words "plus interest as provided for in the Contract Documents" on line 7.

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

9.8.2 Change subparagraph 9.8.2 as follows:

In line 1, add the words "and Architect" after the word "Owner" and change the word "agrees" to "agree" in line 1. Add the words "and Owner" after the word "Architect" on line 3.

9.8.3 Insert the words "and Owner" after the word "Architect" on lines 1 and 6. Insert the words "and Owner's" after the word "Architect's" on line 2.

9.8.5 Delete subparagraph 9.8.5 in its' entirety and substitute the following:

"The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Architect, the Owner shall make payment reflecting adjustments in retainage, if any, for such work or portion thereof as provided in the Contract Documents."

9.10.1 Add the words "and Owner" on both lines 2 and 3 after the word "Architect".

9.10.2 Delete subparagraph 9.10.2 in its' entirety and substitute with the following:

Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect in a form satisfactory to the Owner (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 30 days after written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial 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) final prints for record drawing use marked by the Contractor with record information as set forth in the Contract Documents, (6) a final sworn statement from the Contractor duly executed and acknowledged showing all Subcontractors to be fully paid and similar sworn statements from Subcontractors and, where appropriate, from Sub-Subcontractors, (7) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, 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. If a Subcontractor or Sub-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. If such lien remains unsatisfied after payments are made, or is not bonded over as provided in the preceding sentence, the Contractor shall promptly

pay to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.2.1.4 Add the following as new sub-subparagraph 10.2.1.4:

the environment, including, without limitation, air, water, land, including wetlands, and other natural resources, and plant and animal life of all types.

10.2.2 Delete subparagraph 10.2.2 in its' entirety and substitute with the following:

The Contractor shall give notices and comply with applicable laws (including, without limitation, the requirements of Connecticut General Statutes Section 31-40m relating to toxic substances and the requirements of the Occupational Safety and Health Act and the Construction Safety Act of 1969, as amended, and regulations and standards promulgated thereunder), ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or the environment or their protection from damage, injury, destruction, pollution or loss. Said laws, ordinances, rules, regulations, standards, and lawful orders are incorporated herein by reference.

10.2.2.1 Add new sub-subparagraph 10.2.2.1 as follows:

The Contractor shall be directly responsible for compliance therewith on the part of its agents, employees, materialmen and Subcontractors and shall directly receive and be responsible for all citations, assessments, fines or penalties which may be incurred by reason of its agents', employees', materialmen's or Subcontractors' failure to so comply.

10.2.4 Add the following to subparagraph 10.2.4:

The Contractor shall comply fully and require compliance with all applicable laws, including Connecticut General Statutes Sec. 16-345, et. seq., and the regulations promulgated thereunder, relating to discharge of explosives.

10.2.5 Add the number "10.2.1.4" after the number "10.2.1.3" on lines 2 and 5.

10.2.8 Delete the number "21" in line 4 and replace with the number "10".

10.2.9 Delete the number "21" in line 4 and replace with the number "10".

Add new subparagraph 10.2.9 as follows:

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

The Contractor shall be responsible for the adequate strength and safety of all scaffolding, staging and hoisting equipment and for temporary shoring, bracing and tying.

10.2.10 Add new subparagraph 10.2.10 as follows:

The Contractor shall protect all streets, roads and sidewalks and shall make all necessary repairs at his own expense, and shall maintain these reasonably clean of dirt, mud or other debris that is due to the construction operation.

10.2.11 Add new subparagraph 10.2.11 as follows:

It shall be the Contractor's responsibility to protect finished sidewalks and curbs against damage caused by trucks, etc., driving over them. If they are damaged they must be replaced by the Contractor without cost to the Owner.

10.2.12 Add new subparagraph 10.2.12 as follows:

The Contractor shall furnish approved hard hats, other personal protective equipment as required, approved first aid supplies, name of first aid attendant and a posted list of emergency facilities.

10.3.2 Delete subparagraph 10.3.2 in its' entirety and substitute with the following:

The Owner shall obtain the services of a licensed laboratory to verify the presence of absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to verify that it has been rendered harmless. When the material or substance has been rendered harmless, work in the affected area shall resume. The Contract Time may be extended appropriately.

10.3.3 Delete subparagraph 10.3.3 in its' entirety.

10.3.4 Insert a period after the word "Site" on line 2 and delete the rest of the paragraph.

10.3.6 Delete paragraph 10.3.6 in its' entirety.

ARTICLE 11 - INSURANCE AND BONDS

11.1.2 – 11.3.10 Delete subparagraphs 11.1.2 through 11.3.10 in their entirety and replace them with the attached Indemnification and Insurance Exhibit which shall be fully incorporated by reference into this Agreement.

11.4.3 Add new subparagraph 11.4.3 as follows:

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

The Contractor shall increase the principal amount of the performance and labor and materials payments bond(s) in direct proportion to any increase in the value of the Contract resulting from such change orders.

11.4.4 Add new subparagraph 11.4.4 as follows:

Bonds furnished by the Contractor shall comply with all relevant Connecticut statutes including Conn. Gen. Stat. Sec. 49-41.

ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK

12.1.1 Add the words "or Owner's" after the word "Architect's" in lines 1 and 3. Add the words "or Owner" after the word "Architect" in line 2.

12.1.2 Add the words "or Owner" after the word "Architect" on lines 1 and 2.

12.2.2 Delete sub-subparagraphs 12.2.2.1, 12.2.2.2 and 12.2.2.3 in their entirety and substitute with the following:

12.2.2 If, within one year after the date of final completion of the Work or designated portion thereof, or after the date for commencement of warranties established under subparagraph 9.9.1, 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 the Contractor's sole expense after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This period of one year shall be extended with respect to portions of Work first performed after final completion, by the period of time between final completion and the actual performance of the Work. This obligation under this subparagraph 12.2.2 shall survive acceptance of the Work under the Contract and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.1 Add the following to the end of subparagraph 13.1:

The Work shall comply with all applicable laws, statutes, ordinances, codes, rules, regulations or orders during its performance and its completion.

13.4.1 Delete the words "by law" in line 3 and substitute with the words "at law or in equity".

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

13.4.3 Add new subparagraph 13.4.3 as follows:

No provision contained in the Contract Documents shall create or give to third parties any claim or right of action against the Owner or the Contractor except as specifically provided herein.

13.5.1 Delete subparagraph 13.5.1 in its' entirety and substitute with the following:

If the Contract Documents, or any laws, ordinances, building codes, rules, regulations or orders of any governmental body or public or quasi-public authority having jurisdiction over the Work or the site of the Project require any portion of the Work to be inspected, tested or approved, the Contractor shall give the Architect and the Owner timely notice thereof so Architect and Owner may observe such inspection, testing or approval. The Contractor shall bear all costs of such inspections, test or approvals except where the Contract Documents provide otherwise.

13.6 Delete subparagraph 13.6 in its' entirety.

13.7 Delete paragraph 13.7 in its' entirety.

13.8 CAPTIONS

13.8. The captions and headings of various Articles and Paragraphs in the Contract Documents are for convenience only and are not to be construed as defining or limiting, in any way, the scope or intent of the provisions hereof.

13.9 Add a new Paragraph 13.9 as follows:

13.9 SEVERABILITY

13.9 The invalidity of any covenant, restriction, condition, limitation in any other part or provision of the Contract Documents shall not impair or affect in any manner the validity, enforceability or effect of the remainder of the Contract Documents.

13.10 Add a new Paragraph 13.10 as follows:

In the event of any unavoidable cause beyond the control of the parties, whether natural or man-made, which renders the performance of this contract impossible, the contract shall be terminated. Such occurrences shall include, without limitation, death of the Contractor (in the event that the Contractor is a sole proprietor); destruction of all, or a major portion of the Contractor's equipment; legal order by a court of competent jurisdiction, or referendum barring performance of the contract;

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

war, famine, flood, plague, pestilence or act of God. Any amounts due to either party by the other as the result of actions taken pursuant to the contract prior to the occurrence which renders performance impossible shall be paid, but no further sums shall be due from either party to the other, by way of damages for the termination of the contract.

13.11 Add new paragraph 13.11 as follows:

The Contractor shall comply with Section 12-43 of the Connecticut General Statutes as may be amended.

Sec. 12-43. Property of nonresidents. All owners of real estate, or of tangible personal property located in any town for three months or more during the assessment year immediately preceding any assessment day, who are nonresidents of such town, shall file lists of such real estate and personal property with the assessors of the town in which the same is located on such assessment day, if located in such town for three months or more in such year, otherwise, in the town in which such property is located for the three months or more in such year nearest to such assessment day, under the same provisions as apply to residents, and such personal property shall not be liable to taxation in any other town in this state. The list of each nonresident taxpayer shall contain his post-office and street address. The assessors shall mail to each nonresident, or to his attorney or agent having custody of his taxable property, at least fifteen days before the expiration of the time for filing lists, blank forms for filing lists of such property. The lists of taxable property of nonresidents shall be arranged in alphabetical order and separate from the lists of residents, provided no such separation shall be necessary in any town the board of assessors of which, upon the request of its property tax collector, has made rules and regulations approved by the secretary of the office of policy and management setting up an alternative method of arrangement.

ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

14.1.1 Delete the number "30" on line 1 and substitute with the number "60".

14.1.3 Delete subparagraph 14.1.3 in its entirety and substitute with the following:

If one of the reasons described in subparagraph 14.1.1 or 14.1.2 exists, the Contractor may, upon seven additional days written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for work executed.

14.2.1 Delete subparagraph 14.2.1 in its' entirety and substitute with the following:

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

- 14.2.1 The Owner may terminate the Contract for any of the following causes:
- 14.2.1.1 If the Contractor shall institute or consent to proceedings requesting relief or arrangement under the Federal Bankruptcy Act or any similar or applicable federal or state law or if a petition under any federal or state bankruptcy or insolvency law is filed against the Contractor and such petition is not dismissed within sixty (60) days from the date of said filing, or if the Contractor admits in writing his inability to pay his debts generally as they become due, or if he makes a general assignment for the benefit of his creditors, or if a receiver, liquidator, trustee or assignee is appointed on account of his bankruptcy or insolvency; or
 - 14.2.1.2 If a receiver of all or any substantial portion of the Contractor's properties is appointed; or
 - 14.2.1.3 If the Contractor abandons the Works; or
 - 14.2.1.4 If the Contractor fails to prosecute the Work promptly and diligently; or
 - 14.2.1.5 If the Contractor fails or refuses to supply enough properly skilled workers or proper materials for the Work; or
 - 14.2.1.6 If the Contractor submits an Application for Payment, sworn statement, waiver of lien, affidavit or document of any nature whatsoever which is intentionally falsified; or
 - 14.2.1.7 If the Contractor fails to make prompt payment to Subcontractors or for materials or labor or otherwise breaches his obligations under any Subcontract with a Subcontractor; or
 - 14.2.1.8 If a mechanic's or materialman's lien or notice of lien is filed against any part of the Work or the site of the Project and not promptly bonded or insured over by the Contractor in a manner satisfactory to the Owner; or
 - 14.2.1.9 If the Contractor disregards any laws, statutes, ordinances, rules, regulations or orders of any governmental body or public or quasi-public authority having jurisdiction of the Work or the site of the Project; or

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

14.2.1.10 If the Contractor otherwise substantively violates any provision of the Contract Documents.

14.2.2.1 Delete the semicolon after "Contractor" in line 2 and add:

and may request that the Contractor remove any part or all of his equipment, machinery, and supplies from the site of the Project within seven (7) days from the date of such request, and in the event of Contractor's failure to do so, may remove or store such equipment, machinery and supplies at the Contractor's expense;

14.2.4 Delete subparagraph 14.2.4 in its' entirety and substitute with the following:

If the unpaid balance of the Contract Sum exceeds all costs to the Owner of completing the Work, then the Contractor shall be paid for all Work performed by the Contractor to the date of termination. If such costs to the Owner of completing the Work exceed such unpaid balance, the Contractor shall pay the difference to the Owner immediately upon the Owner's demand. The costs to the Owner of completing the Work shall include (but not be limited to) the cost of any additional architectural, managerial and administrative services required thereby, any costs incurred in retaining another Contractor or other Subcontractors, any additional interest or fees which the Owner must pay by reason of a delay in completion of the Work, attorney's fees and expenses, and any other damages, costs and expenses the Owner may incur by reason of completing the Work or any delay thereof. The amount, if any, to be paid to the Owner or Contractor shall be certified by the Architect, upon application, in the manner provided in Paragraph 9.4, and this obligation for payment shall survive the termination of the Contract".

14.3.2 In line 1, delete "shall" and insert "may".

14.4.3 On line 2, insert a period after the word "termination" and delete the remaining words on lines 2 and 3.

ARTICLE 15 – CLAIMS AND DISPUTES

15.1.2 Delete the number "21" in line 4 and replace with the number "10".

15.2.1 Delete subparagraph 15.2.1 and substitute the following:

Decision of Architect. Claims, including those alleging an error or omission by the Architect, shall be referred initially to the Architect for decision. A decision by the Architect shall be required as a condition precedent to mediation, litigation or other formal method of dispute resolution of all Claims between the Contractor and the Owner arising prior to the date final payment is due, unless no decision has been

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

rendered by the Architect within 45 days of referral of the Claim to the Architect or the Architect fails to provide a decision as scheduled in subparagraphs 15.2.2 through 15.2.5, whichever is later.

15.2.2 On line 4 add the word “or” after the word “Claim,” and add a period after the word “compromise.” Delete the balance of the paragraph after the word “compromise”.

15.2.3 On lines 3 and 4 replace the words “Owner” and “Owner’s” with “claimant” and “claimant’s”.

15.2.4 Delete the last sentence of subparagraph 15.2.4 and substitute the following:

“Within 10 days of receipt of the response or supporting data, if any, the Architect will either reject or approve the claims in whole or in part, or suggest a compromise.”

15.2.5 Delete the second sentence of subparagraph 15.2.5.

15.2.9 Add new subparagraph 15.2.9 as follows:

If a claim has not been resolved after consideration of steps described in subparagraphs 15.2.1 through 15.2.5, then the parties shall make an additional good faith effort to resolve the claim through an informal dispute resolution process mutually agreeable to the parties. If the claim is still not capable of resolution within ten days or such other time period that is mutually agreed upon, the parties may proceed to arbitration, litigation, or formal alternate dispute resolution.

15.2.10 Add new subparagraph 15.2.10 as follows:

If no form of dispute resolution is mutually agreed upon, no party may compel arbitration, mediation or alternate dispute resolution, and the parties may pursue whatever legal remedies are available to them.

15.3 (15.3.1 – 15.3.3) Delete in its' entirety.

15.4 (15.4.1 – 15.4.3) Delete in its' entirety.

END OF SUPPLEMENTARY GENERAL CONDITIONS

PROJECT MANUAL

for

SEDGWICK MIDDLE SCHOOL

AIR HANDLING UNITS REPLACEMENT

**128 Sedgwick Road
WEST HARTFORD, CONNECTICUT 06107**

**Bemis Associates LLC
185 Main Street
Farmington, Connecticut**

JUNE 12, 2020



**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 00020

LIST OF DRAWINGS

COVER

S1.1 DUNNAGE FRAMING PLAN AND DETAILS

ME0.1 MECHANICAL/ ELECTRICAL GENERAL NOTES AND SYMBOLS

MED1.1 MECHANICAL/ ELECTRICAL DEMOLITION WORK- GROUND FLOOR

MED1.2 MECHANICAL/ ELECTRICAL DEMOLITION WORK- FIRST FLOOR

MED1.3 MECHANICAL/ ELECTRICAL DEMOLITION WORK- SECOND FLOOR

ME1.1 MECHANICAL/ ELECTRICAL NEW WORK- GROUND FLOOR

ME1.2 MECHANICAL/ ELECTRICAL NEW WORK- FIRST FLOOR

ME1.3 MECHANICAL/ ELECTRICAL NEW WORK- SECOND FLOOR

M2.0 MECHANICAL SCHEDULES

M3.0 MECHANICAL DETAILS

END OF LIST OF DRAWINGS

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 20 00 50 - GENERAL CONDITIONS FOR MECHANICAL AND ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General provisions of the Contract, including General and Supplementary Conditions, and Division 1, General Requirements apply to the work specified in this Section.
- B. Scope of Work: This Section contains special provisions for Divisions 23 and 26.

1.2 EXAMINATION OF SITE AND DRAWINGS:

- A. Before submitting his bid, Contractor shall visit site with plans and specifications in hand, shall consult with the Engineer and shall become thoroughly familiar with all conditions under which his work will be done since he will be held responsible for any assumptions he may make in regard thereto.
- B. The Contractor shall verify and obtain all necessary dimensions at the building.
- C. Certain present building clearances are available for handling equipment.

1.3 INTENT:

- A. Finished Work: The intent of the specifications and drawings is to call for finished work, completed, tested and ready for operation.
- B. Good Practice: It is not intended that the drawings show every pipe, fitting or minor detail and it is understood that while the drawings must be followed as closely as circumstances will permit, the systems shall be installed according to the intent and meaning of the Contract Documents and in accordance with good practice.
- C. Work under each Section shall include giving written notice to the Town of West Hartford within 15 days after the Award of the Contract of any materials of apparatus believed inadequate or unsuitable or in violation of any laws or codes, or items of work omitted. In the absence of such written notice, it is mutually agreed that work under each Section has included the cost of all required items and labor for the satisfactory functioning of the entire system without extra compensation.
- D. Any apparatus, appliance, material or work not shown on drawings but mentioned in specifications or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be furnished and installed by Contractor at no additional cost to the Town of West Hartford.
- E. Prior to receipt of bids, Contractors shall give written notice to Engineer of any materials or apparatus believed inadequate, unsuitable or in violation of laws, ordinances, rules or regulations of authorities having jurisdiction and any necessary items or work omitted. In the absence of such written notice, it is mutually agreed that Contractor has included the cost

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

of all required items in his proposal and that he will be responsible for approved satisfactory functioning of systems without further compensation.

- F. In all cases where apparatus is herein referred to in singular number, it is intended that such reference include as many such items as are required to complete work.
- G. If not otherwise specified or shown on plans, apparatus and materials shall be installed in accordance with manufacturer's published recommendations and instructions and to the complete satisfaction of the Engineer.
- H. It is the intent of these specifications for Mechanical and Electrical Contractors and/or their subcontractors or equipment suppliers to furnish all equipment complete with all accessories.

1.4 REGULATIONS:

- A. Codes: All work shall be done in strict accordance with the 2018 Connecticut State Building Code, 2018 Connecticut State Fire Safety Code, 2015 IBC, 2015 IPC, 2015 IMC, Connecticut Public Health Code, 2015 NFPA 101, all applicable NFPA Codes, NEC, UL, NEMA, O.S.H.A., with all requirements of local utility companies and the requirements of all governmental departments having jurisdiction.
- B. Precedence: Requirements of the above shall take precedence over plans and specifications.
- C. Equipment construction standards shall be as follows: Pressure vessels shall be constructed in accordance with the ASME Code, all electrical equipment shall be UL listed and approved and conform to the N.E.C., gas equipment shall be approved by A.G.A. and conform to N.F.P.A. Codes, piping materials, fittings, valves and accessories shall be constructed in accordance with A.S.T.M. and A.N.S.I. standards for class of work involved. All equipment and materials shall be new and of domestic manufacture. All the above codes shall be referenced and dated in the Connecticut Basic Building Code.
- D. Wherever discrepancies occur between above regulations and agencies and contract drawings and specifications, the requirements of above shall take precedence, except that the contract drawings and specifications shall be minimum requirements and that contractors shall advise engineer of any required changes before proceeding with work.

1.5 APPROVED FITTINGS:

- A. No material other than that contained in the "Latest List of Electric Fittings" approved by the Underwriters' Laboratories, Inc., shall be used in any part of the work. All wiring, conduit, switches and other material for which label service has been established, shall bear the label of the Underwriters' Laboratories, Inc.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1.6 PERMITS, FEES:

- A. Include all necessary notices, obtain all permits and pay all governmental taxes, fees, and other costs. File all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction. Obtain all required Certificates of the Town of West Hartford before request for acceptance and final payment for the work.

1.7 DEFINITIONS:

- A. Words "finish" or "finished" refer to all rooms and areas listed in Finished Schedule on Drawings. All rooms and areas not covered in Schedule, including underground tunnels and areas above ceilings, shall be considered not finished except as otherwise noted.
- B. The word "provide" means to "furnish and install" reference item.

1.8 PROTECTION:

- A. Work under each section shall include protecting the work and materials of all other sections from damage by work or workmen, and shall include making good any and all damage thus caused.
- B. Each section shall be responsible for work and equipment until finally inspected, tested and accepted. Protect work against theft, weather, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing materials.
- C. If so specified under the respective section, work may include receiving, unloading, uncrating, storing, protecting, setting in place and connecting up completely of any motor starters, control equipment having mechanical/electrical service connections which may be furnished by The Town of West Hartford or furnished under another section. Work under each section shall include exercising special care in handling and protecting equipment and fixtures. Any of the above equipment and fixtures which are missing or damaged by reason of mishandling or failure to protect shall be replaced at no additional cost to the Town of West Hartford.

1.9 EQUIPMENT SUBSTITUTIONS AND DEVIATIONS:

- A. Wherever more than one manufacturer is mentioned in specifications and drawings, any of these named are considered equally acceptable to that on upon which design was based and, providing all requirements are met, insofar as performance, space requirements, noise levels and special accessories or materials are concerned, any of those named may be included in Contractor's bid.
- B. Where Contractor proposes to use an item of equipment which differs from that upon which design was based, which required any redesign of structure, partitions, foundations, piping, wiring or of any other part of Mechanical or Electrical Layout, all such redesign, new drawings or detailing required shall be prepared by Contractor at his own expense for approval of Engineer.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- C. Where approved substitutions or deviations require a different quantity, size or arrange of structural supports, wiring, conduit, piping, ductwork, and equipment from that upon which design was based, all additional items required by the systems shall, with the approval of Engineer, be furnished by Contractor at no additional cost to The Town of West Hartford.

1.10 ELECTRICAL WORK:

- A. The Electrical Section includes all power wiring for all electrical switches, motor starters and unmounted motors, furnished at the job site by other sections or furnished under the Electrical Sections as stated in other sections of the specifications.
- B. The Electrical Section shall install and wire all starters, switches and controls, as specified and/or shown on drawings. This shall include all operating and safety controls. Refer to sections 260000 and 260500 for additional information.
- C. Electrically operated equipment supplied by other sections which will be installed and wired by Electrical Section shall be delivered to him with detailed instructions for their installation and wiring in sufficient time and proper sequence to enable him to meet his work schedule.
- D. Control devices that include mechanical elements, such as float switches, shall be installed by the section furnishing them, but be wired by the Electrical Sections.
- E. Equipment which includes a number of correlated electrical control devices mounted in a single enclosure or on a common base with equipment shall be supplied for installation completely wired as unit with terminal boxes and ample leads and/or terminal strips, ready for electrical wiring.
- F. Electrical Contractor shall furnish local disconnect switch for all equipment and manual motor starter for fractional HP motors.

1.11 DRAWINGS:

- A. The mechanical and electrical drawings are intended to supplement each other and are to be considered as a unit which, taken together in conjunction with the specifications, completely describes the work to be done. All drawings shall be checked to verify spaces in which work will be installed. Where headroom or space conditions appear inadequate, notification shall be given to Engineer before proceeding with installation.
- B. The Engineer may without charge, make modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- C. Note that the drawings are diagrammatic and indicate the general arrangement of the Mechanical and Electrical Equipment and systems, without showing every detail and fitting.
- D. Where conflicts occur between drawings and specifications or within either, the item or arrangement of better quality, greater quality or highest cost shall be included in Contract price. Engineer shall determine the manner or item with which work shall be installed.
- E. Keep one complete set of all drawings, specifications, shop drawings and addenda on the premises at all times in good condition and available to the Engineer and The Town of West Hartford.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1.12 REVIEWS:

- A. The materials, workmanship, design and arrangement of all work installed under the Mechanical and Electrical sections shall be subject to the review of the Engineer.
- B. Where any specific material process of method of construction or manufactured article is specified by name or by reference to the catalog number of a manufacturer, the specifications are to be used as a guide and not intended to take precedence over the basic duty and performance specified or noted on drawings. In all cases, the specific characteristics of the equipment offered for approval, shall be indicated on the shop drawings.
- C. All component parts of each item of equipment or device shall bear the manufacturer's nameplate, giving name of manufacturer, description, size, type, serial or model number, electrical characteristics, etc. in order to facilitate maintenance or replacement. The nameplate of a subcontractor or distributor will not be acceptable.
- D. If material or equipment is installed before it is reviewed, it shall be removed and replaced at no extra charge to the Town of West Hartford if, in the opinion of the Engineer, the material or equipment does not meet the intent of the drawings and specifications.

1.13 SHOP DRAWINGS:

- A. Contractor shall submit for review electronic copies of shop drawings of all new equipment, materials, piping, lighting fixtures, devices, panels and wiring. Engineer's review of shop drawings must be completed before any equipment is purchased or any work is installed.
- B. Shop drawings shall consist of manufacturer's certified scale drawings, cuts or catalog, including descriptive literature and complete certified characteristics of equipment, showing dimensions, capacity, code requirements, motor and drive testing as indicated on the drawings or specifications. Also, sheet metal fabrication drawings drawn to scale of 1/4" to the foot or larger.
- C. Certified performance curves for all pumping equipment shall be submitted for review.
- D. Samples, drawings, specifications, catalogs, etc. submitted for review shall be properly labeled indicating specific service for which material or equipment is to be used, division and article number of specifications governing Contractor's name and name of job.
- E. Catalog, pamphlets or other documents submitted to describe items on which review is being requested, shall be specific and identification in catalog, pamphlet, etc. of item submitted shall be clearly made in ink. Data of a general nature will not be accepted.
- F. Review stamp rendered on shop drawings shall not be considered as a guarantee of measurements of building conditions.

Where drawings are reviewed, said review does not mean that drawings have been checked in detail. Said review does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- G. Failure by the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of Contract and no claim for extension by reason of such default will be allowed.
- H. Prior to submission to shop drawings, the Contractor shall thoroughly check each shop drawing, reject those not conforming to the specifications and indicate by his signature that the shop drawings submitted in his opinion meet Contract requirements.

1.14 CUTTING AND PATCHING:

- A. All cutting of openings in walls, floors, partitions, etc. must be done by the Electrical and/or Mechanical Contractor as required to install the work including all cutting of existing construction work. Cutting shall be neatly done and limited to the minimum size necessary. Contractor shall patch and restore to its original condition any work disturbed as a result of work under this Contract.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP:

- A. All materials and apparatus used shall be new, of first class quality and shall be furnished, delivered, erected, connected and finished in every detail. No materials or apparatus used shall be discontinued or about to be discontinued items.
- B. The Engineer shall have the right to reject any part of the work in case material or workmanship is not of satisfactory quality.
- C. Any unacceptable work and material shall be replaced with acceptable work and material at no additional expense to the Town of West Hartford.
- D. In case there is any doubt of the acceptability of any material, submit samples to the Engineer for approval and only definite approval in writing from the Engineer shall be evidence of such approval.
- E. Such approval shall also be subject to the satisfactory installation of the material.
- F. The work in each of these sections shall be constantly under the direction of a competent superintendent who shall be on the premises during such period as the work is in progress. The superintendent shall familiarize himself with the work of all other sections involved insofar as they relate to or in any way affect the work of these sections, and shall coordinate the work.
- G. Unless otherwise noted, all equipment and materials shall be installed and/or applied in accordance with the recommendations of the manufacturer of said equipment, including the performance of any tests recommended by the manufacturer.

2.2 EQUIPMENT VARIATIONS:

- A. In these specifications and on the accompanying drawings, one or more makes of materials, apparatus or appliances have been specified for use in this installation.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

This has been done for convenience in fixing the standard of workmanship performance of any materials, apparatus or appliance which shall be substituted for those mentioned herein shall also conform to these standards.

- B. Where no specified make or material, apparatus or appliance is mentioned, any first class product made by a reputable manufacturer may be used, providing it conforms to the requirements of these specifications and meets the approval of the Engineer prior to installation.
- C. To substitute other makes of materials, apparatus or appliance, than those mentioned under the mechanical or electrical sections, a request in writing to be allowed to make the substitution shall be made. This request shall be accompanied by complete plans and specifications of the substitution offered. If so requested by the Engineer, also submit samples of both the specified material or appliance and the substitute.

2.3 MOTOR CONTROL:

- A. All motors will be fed from a motor starter. Motor starters shall be furnished by each respective trade for motor driven equipment provided by them. The Electrical Contractor shall install the starters and shall provide all power wiring to the starters, and from the starters to the motors they control. Where required, remote pushbuttons, plates and pilots will be furnished with the starter and will be installed by the Electrical Contractor, unless otherwise called for under the Temperature Control Section of these specifications. All starters for motors which are to be interlocked with another motor shall have suitable auxiliary contacts.
- B. All small motors without built-in thermal protection shall be furnished with thermal switches. These switches and pilots shall be furnished by the Electrical Contractor.

2.4 ELECTRIC MOTORS:

- A. All motors 1/2 h.p. and above shall be integral horsepower polyphase induction motors conforming to NEMA standards MG-1-1967 and shall be T-frame design in sizes 143 T through 445 T. Each shall be NEMA design B with minimum torque values per MG 1-12.37 and 12.38.
- B. Duty shall be continuous, ambient temperature 40 degrees maximum, allowable temperature rise for open drip-proof -90 degrees, TEFC, 80 degrees C with Class B insulation rating all per MG 1-12.42.
- C. Horsepower, speed and frame sized per MG 1-10, 32, 13.02 and 13.06a.
- D. Enclosures - open drip-proof and TEFC per MG 1-1.25, 1.26 and 1.27.
- E. All dimensions per MG 1-11.31a, 11.32a and 11.34a. All motors shall have stainless steel nameplates with NEMA voltage standards shown.
- F. Locked rotor KVA per horsepower shall be designated by proper NEMA code letter per MG 1.10.37.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- G. All motors shall be premium efficiency type with a full load efficiency range of 80 percent to 95 percent. High efficiency motor rating shall meet Northeast Utilities Energy Action Program in accordance with the following schedule:

MINIMUM NOMINAL MOTOR EFFICIENCIES

HP	OPEN DRIP PROOF			HP	TOTALLY ENCLOSED		
	MINIMUM EFFICIENCY				MINIMUM EFFICIENCY		
	1200	1800	3600		1200	1800	3600
1	82.5%	85.5%	80.0%	1	82.5%	85.5%	78.5%
1.5	86.5%	86.5%	85.5%	1.5	87.5%	86.5%	85.5%
2	87.5%	86.5%	86.5%	2	88.5%	86.5%	86.5%
3	89.5%	89.5%	86.5%	3	89.5%	89.5%	88.5%
5	89.5%	89.5%	89.5%	5	89.5%	89.5%	89.5%
7.5	91.7%	91.0%	89.5%	7.5	91.7%	91.7%	91.0%
10	91.7%	91.7%	90.2%	10	91.7%	91.7%	91.7%
15	92.4%	93.0%	91.0%	15	92.4%	92.4%	91.7%
20	92.4%	93.0%	92.4%	20	92.4%	93.0%	92.4%
25	93.0%	93.6%	93.0%	25	93.0%	93.6%	93.0%
30	93.6%	94.1%	93.0%	30	93.6%	93.6%	93.0%
40	94.1%	94.1%	93.6%	40	94.1%	94.1%	93.6%
50	94.1%	94.5%	93.6%	50	94.1%	94.5%	94.1%
60	95.0%	95.0%	94.1%	60	94.5%	95.0%	94.1%
75	95.0%	95.0%	94.5%	75	95.0%	95.4%	94.5%
100	95.0%	95.4%	94.5%	100	95.4%	95.4%	95.0%

- H. Service Factors - open-drip-proof, 1 h.p. through 200-1.15 TEFC all horsepower - 1.0.
- I. Noise level within NEMA standard MG 1-12.49.
- J. In addition to the above, all motors 1 through 20 h.p. shall be TEFC with drain holes for both horizontal and vertical positions. Each shall be equipped with deep groove double shielded ball bearings prelubricated with provisions for regreasing.
- K. Motors smaller than 1/2 h.p. shall be capacitor-start or split-phase type designed for 120 volts, single phase, 60 cycles alternating current.

2.5 ELECTRICAL MOTOR STARTERS:

- A. Motor starters shall be furnished by each respective trade for motor driven equipment provided by them. The Electrical Contractor shall install the starters and shall provide all power wiring to the starters, and from the starters to the motors they control.
- B. Motor starters shall conform to requirements of NEC, NEMA, UL, CSA, and ANSI and shall be suitable for the required horsepower, duty, voltage, phase, frequency, service, and location. All starters shall be furnished in NEMA enclosures suitable for the environment in which they are to be located.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- C. All starters shall be of the same manufacture and shall be furnished in Cutler-Hammer, Square D, General Electric, or Allen Bradley.
- D. Thermal Overloads:
 - 1. All motors 1/8 horsepower or larger shall be provided with thermal-overload protection. Thermal overloads shall be melting alloy ambient temperature compensating type.
 - 2. Thermal overloads shall be sized in accordance with NEC requirements for the nameplate data of the motor(s) as actually delivered to the site.
- E. Starters for manual control of single phase motors up to one (1) horsepower furnished without integral thermal overloads shall be combination manual disconnect switch and starters with thermal overload protection for each ungrounded leg. Starters shall be inoperable if a thermal unit is removed. These starters shall be 2-pole and shall be provided with green neon pilot light and handle guard/lock-off.
- F. Starters for three phase motors shall be full voltage, circuit breaker combination magnetic starters. All circuit breaker combination magnetic starters shall include melting alloy type thermal overload protection, low voltage protection, and two (2) sets of auxiliary normally open and normally closed contacts. Thermal overload protection shall be provided in each ungrounded leg. Starters shall be inoperable if a thermal unit is removed.

All circuit breaker combination magnetic starters shall be equipped with control power circuits. Provide starters with control power transformers of secondary voltage required for the control power circuitry. Provide control power transformers with secondary fusing.

The disconnect handle on circuit breaker combination magnetic starters shall always be in control of the disconnect device with the door opened or closed. The disconnect handle shall be clearly marked as to whether the disconnect device is "on" or "off", and shall include a two-color handle grip, the black side visible in the "off" position, and the red side visible in the "on" position.

 - 1. All circuit breaker combination magnetic starters for manual control of three phase motors shall have start-stop push buttons in the cover and shall be provided with red and green pilot lights.
 - 2. All circuit breaker combination magnetic starters for automatic or interlocking control of three phase motors shall have hand-off-automatic selector switches in the cover and shall be provided with red and green pilot lights.
- G. Starters shall be furnished as part of respective equipment furnished under each Division.

PART 3 - EXECUTION

3.1 CONNECTING TO EXISTING UTILITIES:

- A. Connections to existing utilities that will interrupt the service to the present buildings shall be made at a time agreed upon by the Town of West Hartford,

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- B. If it is necessary to make connections to existing utilities outside the regular working hours, this shall be noted on the written work order and the respective Contractor will be paid for the additional cost of labor over and above what it would cost at regular day time rates.

3.2 FREIGHT, CARTING AND RIGGING:

- A. Contractor shall pay all freight and carting charges necessary to deliver all equipment furnished under his Contract to the site and furnish all necessary rigging to properly rig and set the apparatus on the foundations, frames, etc.
- B. All scaffolding, blocks and tackle, ropes and chains and other equipment necessary to rig and set the apparatus shall be furnished by the Contractor.
- C. The Contractor shall set, level and align all equipment before starting operations.

3.3 SEISMIC RESTRAINTS:

- A. It is the intent of this seismic restraint portion of the specification to provide restraint of all non-structural building system components provided in Sections 15 and 16 in Seismic Zone II. Restraint systems and devices are intended to withstand, without failure, the "G" forces detailed in the chart below:

Design Level of Acceleration At Equipment Center of Gravity Seismic Zone 2)
(Av - >0.1 to 0.19)

Elevation (feet rel. to grade level)	Rigid* Mnt'd Equip	Non-Struct. Architect Component	Flexible* Mnt'd Equip	Pipe, Duct, Cable trays, Conduit, Etc.	Life Safe. Equip
Below Grade up to 20 feet above grade	0.125 "g"	0.250 "g"	0.500 "g"	0.350 "g"	1.000 "g"
21 ft. - 300 ft.	0.500 "g"	0.550 "g"	0.750 "g"	0.650 "g"	1.000 "g"
301 ft. - 600 ft.	0.750 "g"	0.900 "g"	1.000 "g"	1.000 "g"	1.000 "g"

- * Rigid mounted equipment is any equipment mounted directly to structure. Flexible mounted equipment is any equipment mounted on resilient supports, ceiling suspended, roof supported or mounted on an independent frame with any primary natural frequency below 16 Hz.
- B. Seismic restraints shall be as required by 2003 IBC, Chapter 16 and State of Connecticut 2005 Supplement.
- C. Seismic Certificate and Analysis
 1. Seismic restraint calculations must be provided for all connections of equipment to the structure.
 2. Calculations to support seismic restraint designs must be stamped by a registered professional engineer licensed in the State of Connecticut.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

3. Analysis must indicate dead loads, derived loads, and materials used for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameters, embedment, and weld length.
 4. A seismic design errors and omissions insurance certificate must accompany submittals.
- D. Submit drawings showing locations of all seismic restraints for equipment, piping, and conduit provided under Sections 15 and 16:
1. The term EQUIPMENT includes ALL non-structural components. These specifications are applicable within the facility and 5 feet outside of the foundation wall. Equipment buried underground is excluded but entry of services through the foundation wall is included. Equipment referred to below is a partial list; (equipment not listed is still included in this specification).
- | | |
|-------------------|-----------------------|
| Air Separators | Water Heater |
| Light Fixtures | Bus Ducts |
| Piping | Boiler |
| Pumps (All types) | Cable Trays |
| Switching Gear | Tanks (All types) |
| Conduit | All Electrical Panels |
- E. Submittals shall include a listing of all isolated and non-isolated equipment to be restrained.
- F. Seismic restraints shall not be required for the following installations:
1. Piping in mechanical rooms less than 1 1/4-inch inside diameter.
 2. All other piping less than 2 1/2-inch inside diameter.
 3. All electrical conduit less than 2 1/2-inch inside diameter.
 4. All rectangular air-handling ducts less than 6 square feet in cross-sectional area.
 5. All round air-handling ducts less than 28 inches in diameter.
 6. All piping suspended by individual hangers 12 inches or less in length from the top of the pipe to the bottom of the support for the hanger.
 7. All ducts suspended by hangers 12 inches or less in length from the top of the duct to the bottom of the support for the hanger.
- G. Life safety systems defined:
1. All systems involved with fire protection including sprinkler piping, service water supply piping, fire dampers and smoke exhaust systems.
 2. All systems involved with and/or connected to emergency power supply including all generators, transfer switches, transformers and all flowpaths to fire protection and/or emergency lighting systems.
 3. Fresh air relief systems on emergency control sequence including air handlers, conduit, duct, dampers, etc.

3.4 COOPERATION WITH OTHER TRADES:

- A. No piping, conduit, valves, boxes, etc., shall be installed until the entire run has been checked for clearance and the work has been coordinated between all the trades. Each tradesman shall be responsible for taking his own field measurements and maintaining

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

proper clearance from the Town of West Hartford's equipment and the work of other trades, and for coordinating his work with that of other Contractors and The Town of West Hartford. Furnish all necessary information, dimensions, templates, etc. in order that a perfectly coordinated job will result.

- B. Contractor shall carry out his work in conjunction with other trades and shall give full cooperation to other trades. Contractor shall furnish all information necessary to permit work of all trades to be installed in a satisfactory manner.
- C. Where space is so limited that Contractor's work shall be installed in close proximity to the work of other trades or where it is evident that Contractor's work will interfere with other trades, he shall assist in working out space conditions to make satisfactory adjustments. If required or directed by Engineer, the Contractor shall prepare composite working drawings and sections of not less than 3/4" -1'-0" scale clearly showing how his work is to be installed in conjunction with other trades; he shall make corrections necessary to satisfactorily complete installation at no additional cost to The Town of West Hartford.
- D. All supports for hanging material to be connected to steel structure shall be installed prior to installation of fire proofing material. Any damage to fireproofing caused by late installation of hanging material shall be repaired by the Fire-proofing Contractor at the expense of the Contractor responsible.
- E. The Heating Contractors shall give to the Electrical Contractor all information on switches, controls, pilots, etc. furnished under the Heating Contracts, together with makes and catalog numbers where required to permit the Electrical Contractor to leave the proper boxes to receive same. This information shall be given well in advance so that the Electrical Contractor may install his work as construction progresses. In the event that this information is not given in time to permit the Electrical Contractor to leave proper boxes, etc. as construction progresses, it shall be the responsibility of the Contractor to pay all costs of cutting and patching.

3.6 INFORMATION FOR ELECTRICAL CONTRACTOR:

- A. Deliver to the Electrical Contractor all information on motors and controls furnished under the Mechanical Contract, together with makes and catalog numbers, to permit the Electrical Contractor to leave the proper boxes and wiring.

3.7 SLEEVES, INSERTS AND ANCHOR BOLTS:

- A. All pipes and conduits passing through floors, walls or partitions shall be provided with sleeves sized to give a minimum of 1/2" clearance between sleeve and the outside diameter of the pipe, conduit or insulation, enclosing the pipe or conduit.
- B. Sleeves through concrete floors or interior masonry walls shall be Schedule 40 steel pipe, set flush with finished wall or ceiling surfaces, but extending 2 inches above finished floors or shall be in accordance with details on drawings. In all mechanical equipment rooms sleeves shall extend 6 inches above finished floor.
- C. Inserts shall be individual or strip type of steel or malleable iron construction for removable nuts and threaded rods up to 3/4" diameter, permitting lateral adjustment.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

3.8 FIRE STOPPING:

A. General

1. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

B. General Description of The Work

1. Only tested firestop systems shall be used in specific locations as follows:
Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

C. References

1. Test Requirements: ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops" (July 1997).
2. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
3. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
4. Test Requirements: ASTM E 84-96, "Surface burning characteristics".
5. All major building codes: ICBO, SBCCI, BOCA, and IBC.
6. Test Requirements: ASTM E-119, "Fire Test of Building Construction and Materials" (UL 263)

D. Quality Assurance

1. Firestop System installation must meet requirements of ASTM E-119, ASTM E-814, ASTM E-84-96, UL 236, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
2. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. Submittals

1. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
2. Submit material safety data sheets provided with product delivered to job-site.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

F. Installer Qualifications

1. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacture's products per specified requirements.

G. Products, General

1. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
2. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
3. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

H. Acceptable Manufacturers

1. Subject to compliance with through penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
 - a. Hilti, Inc., Tulsa, Oklahoma 800-879-8000
 - b. Other manufacturers listed in the U.L. Fire Resistance Directory – Volume

I. Materials

1. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
2. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
3. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

J. Preparation

1. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - a. Verify penetrations are properly sized and in suitable condition for application of materials.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- b. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
- c. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
- d. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
- e. Do not proceed until unsatisfactory conditions have been corrected.

K Coordination

- 1. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- 2. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

L. Installation

- 1. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.
- 2. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - a. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
 - b. Consult with project manager and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
 - c. Protect materials from damage on surfaces subjected to traffic.

M. Field Quality Control

- 1. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- 2. Keep areas of work accessible until inspection by applicable code authorities.
- 3. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

N. Adjusting and Cleaning

- 1. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- 2. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

3.9 ACCESSIBILITY:

- A. Locate all equipment which must be serviced, operated or maintained in fully accessible positions. Equipment shall include but not be limited to motors, controllers, switchgear, drain points, etc.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- B. In the event that any equipment is not installed to permit convenient servicing, disassemble, removal of parts, etc. the Contractor shall, at his own expense, make all corrections necessary to accomplish this.

3.10 LUBRICATION:

- A. All equipment having moving parts and requiring lubrication which is installed under this Contract, shall be properly lubricated according to manufacturer's recommendations prior to testing and operation. Any such equipment discovered to have been operated before lubrication is subject to rejection and replacement at no cost to the Town of West Hartford. Units furnished with sealed bearings are accepted.

3.11 TAGS, CHARTS AND NAMEPLATES:

- A. Each valve, control, switch, electrical panel, motor and any piece of apparatus installed under these sections shall be properly identified.
- B. Each sectional shutoff valve shall have a brass tag with identifying number. Tag shall be secured to valve stem with sufficient length of copper coated jack chain to allow tag to be easily read.
- C. All other equipment, including panels and switches, shall be provided with a suitable laminated plastic nameplate fastened with screws or rivets. Small equipment labels may use a pressure sensitive tape.
- D. All nameplates and labels shall identify components by proper nomenclature and numbered according to equipment schedule or as designated.
- E. Charts shall be furnished in duplicate and shall include the valve identification number, location and purpose. One chart shall be mounted in frame with a clear glass front and secured to wall in location directed.
Second chart shall be for use throughout building and shall be provided with transparent plastic closure for top and attached 8" bead chain for hanging. Holes to be reinforced with brass grommets. Tags and closures as manufactured by Seton Name Plate Corp., New Haven, Conn., or approved equal.

3.12 INSTRUCTIONS:

- A. Prepare written instructions frames for the proper maintenance and operation of any special equipment furnished and installed under this Contract.
- B. Personally instruct the Town of West Hartford's Custodian or official representative in addition to furnishing all manuals, diagrams, etc. in the proper operation and maintenance of all equipment and piping installed under this Contract.
- C. Prepare a portfolio with all tags, operating manuals, parts lists, guarantees, etc. that are packed with all equipment furnished under this Contract and submit same to the Engineer.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

3.13 PIPING CODE MARKERS:

- A. All service piping which is accessible for maintenance operations shall be identified with vinyl plastic color bands and legends at each branch and riser take-off, at each passage through wall, floor and ceiling, adjacent to each valve and on all pipe runs marked each 20'-0". Pipe markers to conform to A.S.A. Bulletin A-13. Where pipes are too small for legends, brass identification tags 1-1/2" in diameter with depressed 1/2" high black filled letters shall be fastened with chain. Pipe markers and tags as manufactured by the Seton Name Plate Corp., New Haven, Conn., or equal approved.

3.14 CLEANING PIPING, CONDUITS AND EQUIPMENT:

- A. Thoroughly clean all piping and equipment of all foreign substances inside and out before being placed in operation.
- B. If any part of a system should be stopped by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Town of West Hartford.
- C. During the course of construction, all pipe and electrical conduits shall be capped in an approved manner to insure adequate protection against the entrance of foreign matter.

3.15 CLEANING UP:

- A. After completion of the work, remove all waste, rubbish and other materials left as a result of operations and leave the premises in clean condition.
- B. All fixtures, equipment, etc. installed under the Mechanical and Electrical Sections shall be free of dirt, grease and other foreign material and left in perfectly clean condition and ready to use.

3.16 GUARANTEE:

- A. All parts of the work and all equipment shall be guaranteed for a period of 18 months from the date of acceptance of the job by the Town of West Hartford.
- B. If during that period of general guarantee, any part of the work installed fails, becomes unsatisfactory or does not function properly due to any fault in material or workmanship, whether or not manufactured or job built, each section shall upon notice from the Town of West Hartford, promptly proceed to repair or replace such faulty material or workmanship without expense to the Town of West Hartford, including cutting, patching and painting or any other work involved and including repair or restoration of any damaged sections of the premises resulting from such faults.
- C. In the event, that a repetition of any one defect occurs, indicating the probability of further failure, and which can be traced to faulty design, material or workmanship, then repairs or

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

replacement shall not continue to be made but, the fault shall be remedied by a complete replacement of the entire defective unit.

- D. In addition to the general guarantee, obtain and transmit to the Town of West Hartford any guarantees or warranties from manufacturers of specialties but only as a supplement to the general guarantee which will not be invalidated by same.

3.17 THE TOWN OF WEST HARTFORD'S INSTRUCTIONS AND SYSTEM OPERATION:

- A. At the time of the job's acceptance by the Town of West Hartford, Contractor shall furnish maintenance and operating instructions for all equipment including parts list. These instructions shall be written in layman's language and shall be inserted in vinyl covered three-ring loose leaf binder. This information in binder shall be first sent to the approved by the Engineer before turning over to the Town of West Hartford.
- B. Upon completion of all work and of all tests, each Division shall furnish the necessary skilled labor and helpers for operating the system and equipment for a period of one (1) day of eight (8) hours, or in two (4) hours separate sessions. During this period, instruct the The Town of West Hartford or his representative fully in operation, adjustment and maintenance of all equipment furnished. Give at least forty-eight (48) hours notice to the Town of West Hartford in advance of this period.

3.18 THE TOWN OF WEST HARTFORD'S ACCEPTANCE TEST:

- A. After the various systems are complete as determined by preliminary operating tests, the Contractor shall arrange for the Town of West Hartford's final acceptance tests.
- B. The Contractor shall have present at each acceptance test, representatives of the several Contractors whose work is directly or indirectly involved, with instruments as necessary in accordance with the design and to include the following.
 - 1. All equipment installed and operating in accordance with manufacturer's instructions and performance guarantee.
 - 2. All systems operating in accordance with specifications.
 - 3. All distribution systems properly adjusted for distribution to equipment as specified.
 - 4. The various systems properly flushed, cleaned, and free of entrapped air and dirt.
 - 5. All motors installed with proper thermal overload protection and not operating under overload conditions as determined by ammeter readings.
 - 6. All valve charts, etc. as specified in various parts of the specifications installed or ready for delivery to the Town of West Hartford.
- C. The date of the Town of West Hartford' acceptance of the equipment shall be the start of the one year guarantee period.

3.19 TEST:

- A. Conducting Tests: Conduct all tests called for under the various sections or as required and repair or replace any defects. Perform all tests in the presence of and to the satisfaction of the Engineer and such other parties as may have legal jurisdiction.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- B. Defective Work: The Town of West Hartford shall have the privilege of stopping any of the work not being properly installed. All such defective work shall be repaired or replaced and the tests shall be repeated.
- C. Repair Damaged Work: Repair all damages resulting from tests and replace damaged materials.

END OF SECTION 20 00 50



**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.
- B. The General Requirements in Section 200050 shall also govern the work under this Section.
- C. Examine all drawings and data and coordinate the work of this Section with all related and adjoining work.

1.2 SCOPE OF WORK:

- A. Provide all labor, materials, equipment and tools required to complete the work described and shown on the contract drawings.

PART 2 -PRODUCTS

2.1 PRODUCTS:

- A. None required.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Work shall be performed only by a firm which employs certified testing, adjusting and balancing technicians as listed by the National Environmental Balancing Bureau (NEBB), Associated Air Balance Council (AABC) and the Sheet Metal Industry National Certification Board of TABB Technicians. The work may be performed by a certified Test, Adjusting and Balancing technician who may be assisted by other TAB technicians. This firm shall provide personnel trained and experienced in system balancing. This requirement will not be waived under any condition.
- B. Before submitting system performance data for approval or acceptance, the firm shall perform all necessary tests and make all necessary adjustments as required to obtain the flow and distribution of air as called for on the Contract Documents.
- C. The balance reports shall include the names, signatures and registration numbers of the technicians assigned to the project.

3.2 ACCEPTABLE FIRMS:

- A. The following listed firms are approved to perform this work:

James Brennan Company
Environmental Testing and Balance
Wing's Testing and Balancing
Technical Associates Group, Inc.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- B. Request to employ any other balancing and testing firm must be accompanied by a complete brochure of the firm listing previous installations successfully balanced, length of time in business, names and qualifications of employees and list of instruments available for use on the project.

3.3 AIR HANDLING SYSTEMS:

- A. Prior to the start of balancing the firm shall check the rotation of all fans.
- B. Check to verify that all backdraft dampers are free to open and close. All filters must be checked and, if dirty, they must be replaced before commencing balancing so as not to create excessive resistance to the system. The firm shall make any necessary changes in fan speed to obtain design system conditions and shall realign all belts when necessary.
- C. This Section shall be responsible for identifying any necessary changes in pulleys and belts required to obtain proper air delivery and shall request additional dampers, splinters, turning vanes, turbulence vanes and other devices if necessary to obtain the correct air balance, all as directed by the Town or his Representative.

This Contractor shall advise the Mechanical Contractor of the required corrections to the air distribution system, so that the system will perform as designed. All corrective work shall be done at no additional cost to the Town.

- D. The firm shall compile the following data for each air system insofar as they apply and shall include it on the final submittal:

FAN DESCRIPTIVE DATA

System Number
Location Served
Fan Size
Fan Make
Fan Horsepower
Motor Safety Factor
Heater Manufacturer & Size

FAN DESIGN & DELIVERED CONDITIONS

Fan Rpm
Motor Rpm
Total and/or external static pressure
Amperage
Voltage & Phase
Brake Horsepower
Cfm Supply
Cfm Return
Cfm Exhaust
Fresh Air Percent and quantity
Return Air Percent and quantity
System Static Pressure profile
Final damper Settings
VFD drive Speeds, Static Pressure control points

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SYSTEM DESIGN & DELIVERED CONDITIONS

Each outlet shall be identified as to location and area
Register or diffuser size
Register or diffuser factor
Register or diffuser free area, core area, or neck area
Design Cfm
Design Rpm
Final Rpm Reading
Final Cfm
Outlet manufacturer and type
Type of instrument and method used

- E. The firm shall set all dampers of all types for proper air flow. No system causing objectionable air noise will be accepted. All hand volume dampers shall be marked at their final position. Balancing Contractor shall adjust blades on all the supply registers for the deflection indicated on drawings, so that the desired air circulation is achieved.
- F. The firm shall provide all instruments and accessories required to perform the tests and shall make their own provisions for inserting the instruments. This section shall patch/plug all test holes that were made in the ducts/AHU/RTU/ERU to perform the test.
- G. The firm shall notify the Town's Representative when they will start work. Prior to this time, the firm shall submit qualifications and intended testing procedure and shall send their supervising engineer to the office of the Town or his Representative to review the design, desired operation, and method of balancing of the job.
- H. Upon completion of the work, the firm shall certify that all systems are properly balanced and are delivering, returning or exhausting the required quantities. The firm shall deliver to the subcontractor five (5) copies of the test report for transmittal to the Owner's Representative.
- I. Check all safety controls and record control sequences.
- J. Check and record air temperatures.
- K. Check scheduled air control record the operation by simulating complete operating cycle.
- L. After completion of balancing, mark location of all final positions of dampers.
- M. In addition to the above requirements, the final report shall include the following:
 - 1. Static pressure reading across filters, coils, of each air handling system showing design and actual readings.
 - 2. Measured suction, discharge and total static pressure for each fan.
 - 3. Design and actual CFM from each outlet and return/exhaust.
 - 4. Outside air, air on and off heating furnaces, air off cooling coils and terminal air supply temperatures for each air handling system.
 - 5. Rated and actual motor current, in amperes, of every motor at full load conditions.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

3.4 HYDRONIC SYSTEMS:

- A. Prior to the start of balancing, the firm shall check the rotation of all pumps.
- B. The firm shall compile the following data for each pump insofar as they apply and shall include it on the final submittal:

PUMP DESCRIPTIVE DATA

Pump Number
System Served
Pump Size
Pump Make
Pump Horsepower
Motor Safety Factor
Motor Manufacturer & Size
Voltage & Phase

PUMP DESIGN & DELIVERED CONDITIONS

Pump Rpm
Pump Inlet & Outlet Pressure
Amperage
Brake Horsepower
Gpm Supply

SYSTEM DESIGN & DELIVERED CONDITIONS

Flow (Gpm) through each pump
Inlet & Outlet temperature at 3-way valve
Flow (Gpm) through each coil
Inlet & Outlet Pressure at each coil
Inlet & Outlet temperature at each coil
Type of instrument and method used
Total developed head

3.5 INSTALLATION TOLERANCES:

- A. Adjust air handling systems to the following tolerances:
 - 1. Supply systems shall be balanced so that:
 - a. The total quantity to each space is within -5% to +10% of design values.
 - b. If two outlets in space, each outlet is within -10% to +10% of design value.
 - c. If three or more outlets in space, each outlet is within -15% to +15% of design value.
 - 2. Exhaust and return systems shall be balanced so the total quantity from each space is -10% to +10% of design values.
- B. Adjust heating system to the following tolerances:
 - 1. Supply water temperature up to 120 deg. F 0% to -5% to +5% of design value.
 - 2. Supply water temperature 120 degree F to 160 deg. F -5% to +10% of design value.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

3. Supply water temperature above 160 degree F -10% to +10% of design value.

3.5 FIELD VERIFICATION:

- A. The design Engineer may request verification of data contained in the balancing report. If requested the TAB technician whose initials appear on the data sheets shall take outlet and inlet readings selected at random by the Engineer who will compare these readings to those in the submitted report. If the field verification is not satisfactory, the firm doing the TAB work shall completely rebalance the system and a new report shall be prepared and submitted for approval.

END OF SECTION 23 05 93



**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 230700 - HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General Provisions of the Contract, including General and Supplementary Conditions and Division 01, General requirements, apply to the work specified in this Section.
- B. The General Requirements in Section 200050 shall also govern the work under this Section.
- C. Scope of Work: This Section contains details for the insulation of pipe, ductwork and equipment installed under Division 23.

1.2 SUBMITTALS:

- A. In accordance with Section 200050, the following items shall be submitted for approval.
 - Hot and Chilled Water pipe insulation
 - Ductwork insulation
 - Equipment insulation
- B. Recycled Content: Provide data showing recycled materials content of materials and fabricated items provided for this project, stated as a percentage of the materials included in these items or materials provided as part of the Work of this Section.
- C. Connecticut High Performance Building Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content and chemical components.
 - 2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that product 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."

1.3 MECHANICAL SYSTEMS INSULATION:

- A. Furnish and install all thermal and protective insulation as specified herein for piping, ductwork and equipment as shown on the drawings.
- B. The following mechanical items shall be insulated:
 - Fittings - Valve bodies, Victaulic couplings, elbows, tees, etc.
 - Ductwork, supply and outside air
 - Equipment insulation

1.4 SYSTEM PERFORMANCE

- A. Insulation materials furnished and installed hereunder should meet the minimum thickness requirements of ASHRAE 90.1 (2013), "Energy Efficient Design of New Buildings," of the American Society of Heating, Refrigeration, and Air Conditioning Engineers. However, if other

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

factors such as condensation control or personnel protection are to be considered, the selection of the thickness of insulation should satisfy the controlling factor.

- B. Insulation materials furnished and installed hereunder shall comply with NFPA 255 and shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with the following testing standard:

Underwriters' Laboratories, Inc. UL 723

Adhesives used for applying the sealed jackets shall also conform to these same ratings. The use of wheat paste or any other material not meeting these requirements will not be allowed.

1.5 QUALITY ASSURANCE

- A. Insulation materials and accessories furnished and installed hereunder shall, where required, be accompanied by manufacturers' current submittal or data sheets showing compliance with applicable specifications.
- B. Insulation materials and accessories shall be installed in a workmanlike manner by skilled and experienced workers who are regularly engaged in commercial insulation work.
- C. All covering and insulating materials shall be manufactured by Johns Manville, Owens-Corning, Knauf, or Armstrong.

1.6 SEAMS:

- A. On exposed insulation, all longitudinal seams shall be kept at the top and back of the pipe and circumferential joints shall be kept to a minimum. Raw end of insulation shall be concealed by neatly folding the ends of the jackets. Fittings, valve bodies and flanges shall be furnished with the same jacket materials used on adjoining insulation.

1.7 PRIOR TESTING:

- A. Covering shall not be applied until all parts of the work have been tested by the Contractor and reviewed by the Engineer.

1.8 VAPOR BARRIER:

- A. Vapor barrier shall be applied in accordance with the manufacturer's instructions to maintain the integrity of the vapor barrier on cold systems.
- B. An approved vapor retarder mastic compatible with PVC must be applied between pipe insulation and fitting cover, and on fitting cover and throat overlap seam.
- C. For fittings where operating temperature is below 45 deg. For where pipe insulation thickness is greater than 1 ½", two or more layers of Hi-Lo temp insulation inserts shall be installed beneath fitting cover.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1.9 METAL SHIELDS:

- A. Metal shields, 16 gauge galvanized, shall be applied between hangers or supports and the pipe insulation. Shields shall be roll formed to fit the insulation and shall extend up to the center line of the pipe and the length specified for the insert. Insulation shall be rigid type for length of shield to prevent crushing.

1.10 DELIVERY AND STORAGE OF MATERIALS

- A. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.
- B. The contractor shall use whatever means are necessary to protect the insulation materials and accessories (wick material, sealing tape, etc) before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The contractor shall also use all means necessary to protect work and materials installed by other trades.

PART 2 - PRODUCTS

2.1 PIPING:

- A. Insulate all new hot and chilled water and condensate lines with Owens-Corning Fiberglass ASJ with S.S.L. II, pipe insulation with double self-sealing lap having a factory applied jacket. All horizontal and vertical insulated piping located below 8'-0" AFF level and not protected with enclosures shall be protected with Zeston 2000 P.V.C. 30 Mil jacketing. Outdoor, exposed piping shall be protected with aluminum jacket.
- B. All concealed piping shall be covered as follows: Apply insulation to clean dry pipe with side and end joints butted tightly. Seal lap of jacket and butt joint strips with Benjamin Foster 82-07 vapor barrier lap adhesive. Insulate fittings, flanges and valves of piping with mitered pipe insulation, or F/G pre-molded fittings made smooth with insulating cement and jacket with glass cloth saturated with Benjamin Foster 30-60 lagging adhesive. Vinyl or plastic fitting jackets will be allowed.
- C. Insulate chilled water, condensate piping the same as for hot piping above except vapor seal all joints, seams, elbows and fittings.
- D. For all insulated pipes, including refrigerant piping, exposed to weather apply a 16 mil embossed aluminum jacket with 2" overlap at longitudinal and circumferential joints. Secure in place with 3/4" x .015" aluminum band 18" on centers. All seams shall be sealed weather tight.
- E. Foam insulation:
 - 1. Piping and Fittings. MicroLok plain pipe insulation shall be wired or taped in place over clean, dry pipe with all joints butted firmly together. Vapor retarder shall be Micro-Lok AP-T plus.
 - 2. The insulation shall be finished with metal jacketing with a laminated moisture retarder. Metal jacketing shall be overlapped 2 to 3 inches (51 to 76 mm) and held in place with sheet metal screws or metal bands.
 - 3. Elbows and tees shall be finished with matching metal fitting covers. Other fittings in metal-jacketed systems shall be finished with conventional weather-resistant insulating materials with painted aluminum finish.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- F. Insulate all refrigerant lines with Armacell foam insulation with vinyl protective coating. Acceptable substitutions are by Imcolock or Aeroflex.
- G. Provide minimum insulation thickness in accordance with the following table.

Minimum Pipe Insulation

Piping System Types	Conductivity	Mean Rating temp	Fluid Temp. Range	Runout 2 in +	1 in. and less	1-1/4 to 1 1/2	2 to 4 in.	5 and Larger
	BTUin/hsqftF	F	F	in.	in.	in.	in.	in.
Heating Systems								
Low Temp	.25-.29	125	120-200	0.5	1.0	1.0	2	2
Cooling Systems								
Chilled Water or Refrigerant	.22-.28 .22-.28	100 100	40-60 Below 40	.75 1.0	1.0 1.0	1.0 1.5	1.5 1.5	1.5 1.5

Reinsulate duct where insulation has been disturbed under this contract and feather to remaining insulation.

2.2 REFRIGERANT INSULATION

- A. Insulation shall be a flexible, closed-cell elastomeric pipe insulation: AP Armaflex, AC Accoflex. Adhesive shall be Armaflex 520, 520 Black or 520 BLV Adhesive. The insulation must conform to ASTM C534 Grade 1, Type I.
Insulation materials shall have a closed cell structure to prevent moisture from wicking which makes it an efficient insulation.
Insulation materials shall be manufactured without the use of CFC's, HFC's or HCFC's. It is also formaldehyde free, low VOCs, fiber free, dust free and resists mold and mildew.
Insulation materials shall have a flame-spread index of less than 25 and a smoke-developed index of less than 50 as tested in accordance with ASTM E 84. In addition, the products, when tested, shall not melt or drip flaming particles, and the flame shall not be progressive.
Insulation materials shall have a maximum thermal conductivity of 0.27 Btu-in./h-ft²-°F at a 75°F mean temperature as tested in accordance with ASTM C 177 or ASTM C 518.
Insulation materials shall have a maximum water vapor transmission of 0.08 perm-inches when tested in accordance with ASTM E 96, Procedure A.
- B. All liquid and suction lines shall be insulated continuously from a point 6" inside the display case to the suction service valve at the compressor.
All low temperature lines (+10°F and below) shall be insulated with a minimum of 1" wall thickness.
All medium and high temperature lines (above +10°F) shall be insulated with a minimum of 3/4" wall thickness.
Heat reclaim lines shall be insulated from the condensing unit to the heat reclaim units with 3/4" thickness.
All refrigerant copper lines must be free of extraneous chemicals such as corrosive cleaners or building materials' dust prior to the installation of the insulation. The insulation must be clean and dry prior to installation.
Refrigerant pipe shall be sealed while slipping on insulation to prevent foreign matter from

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

entering the tube.

- C. Insulation is to be slid onto pipe; longitudinal slitting of the insulation is not allowed except on mitered sections. Insulation shall be pushed onto pipe, not pulled. Insulation shall be mitered, pre-adhered and longitudinally slit inside throat to fit over all P-traps, tees and elbows or bends over 90°. All butt joints and mitered seams shall be adhered with full coverage of adhesive on both surfaces. Insulation shall not be stretched when adhering.
- D. Insulation must be installed in an adequately ventilated area. It may be necessary to increase insulation thickness if adequate ventilation is not present, Do not crowd the insulation, allow for adequate air movement. At the beginning, at every 12 to 18 feet, and at the ends of piping runs, the insulation shall be adhered directly to the copper using a 2" strip of adhesive. Insulation should not be adhered to the pipe at the extreme low points in any piping run. Saddles shall be installed under all insulated lines at unistrut clamps, clevis hangers, or locations where insulation may be compressed.
- E. Armaflex IPH or NPH insulation pipe hangers can be installed at the compression locations and the seams shall be sealed with Armaflex 520, 520 Black or 520 BLV contact adhesive. To minimize the movement of Armaflex, it is recommended that a pair of non-skid pads be adhered to the clamps. In addition, to prevent loosening of the clamps, use of an anti-vibratory fastener, such as a nylon-locking nut, is also recommended. Wood dowels or blocks, of a thickness equal to the insulation, can be inserted and must be completely sealed into the insulation at the saddle locations. All seams shall be sealed with Armaflex 520, 520 Black or 520 BLV contact adhesive. Hangers clamped directly to the pipe shall be insulated over the hanger; insulation shall be fully adhered to the hanger. In addition, hangers with double rods shall be insulated between the rods. All seams of the insulation shall be sealed with adhesive. All insulation exposed to sunlight or installed outdoors shall be protected with two coats of WB Armaflex Finish or weather resistant coating and aluminum jacket.

2.3 FITTING COVERS:

- A. Fitting covers may be used in lieu of insulating cement and jacket. Provide fitting covers in Zeston - 2000 P.V.C. (20 Mil thickness) by Manville.
- B. General - The matching insert (fiberglass) should either be wrapped completely around the fitting or snugly positioned inside the fitting for proper fit. The insert shall cover the full inner surface area of the fitting cover. The fitting cover is then to be applied over the fitting and insert, and the throat secured by either tack fastening, taping, or banding.
- C. Cold Pipe - Fitting systems below ambient temperature must have a continuous vapor barrier, either with pressure sensitive PVC Tape, or an approved adhesive system. When PVC Tape is used, a 2" downward lap is required. On cold lines in severe ambient temperatures, the fiberglass insert shall be the same thickness as the adjacent pipe insulation. All joints shall then be sealed with PVC Tape.

2.4 DUCTWORK:

- A. Insulate all plenums, intake ducts, air conditioning ducts and warm air supply ducts in concealed locations with 1" thick fiberglass faced duct wrap type IV with factory applied flame retardant foil reinforced Kraft (FRK-25 U.L. labeled). Exhaust duct in the locker rooms shall be insulated the same as the supply ducts (including steam and sauna rooms exhaust ducts).

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- B. Insulation shall be wrapped tightly on the ductwork with all circumferential joints butted and longitudinal joints overlapped a minimum 2". Adhere insulation with 4" strips of Benjamin Foster 85-15 bonding adhesive at 8" o.c.

Additionally secure insulation to the bottom of concealed rectangular ductwork over 24" wide with suitable mechanical fasteners at not more than 18" o.c.

- C. On circumferential joints, the 2" flange on the facing shall be stapled with 9/16" flare-door staples on 6" centers and taped with minimum 3" wide foil reinforced Kraft tape. On longitudinal joints, the overlap shall be stapled on 6" centers and taped with minimum 3" wide foil reinforced Kraft tape. All pin penetrations or punctures in facing shall also be taped.
- D. Insulate air conditioning ducts or warm air ducts, all fresh air intake ducts, louver blanks, plenums in finished spaces or Mechanical Equipment Rooms, with 1" thick fiberglass ASJ-25 equipment insulation.
- E. Insulation shall be cut to fit the shape and contour of the equipment. All voids between equipment surface and insulation shall be packed with light density fiberglass. Impale insulation over welded pins on 12" centers and secure in place with speed washers.
- F. The insulation shall be vapor sealed to provide a complete airtight envelope. Vapor barrier shall consist of one layer of Ludlow Foil Barrier Paper smoothly adhered to the insulation or cement surface with Benjamin Foster 82-07 Vapor Barrier Lap Adhesive.

Lap all joints a minimum of 3" and seal with B.F. 82-07.

- G. It is not necessary to cover exhaust ductwork, return duct or ductwork which is called for to be lined. However, exhaust ductwork from motorized damper to exhaust louver shall be covered as called for above, or exhaust ductwork located on cold side of building insulation shall be covered as called for above.
- H. Supply ducts located in vented/unvented attic shall be insulated with duct insulation with min. R-8 value. Return ducts and exhaust ducts associated with energy recovery systems located in vented/unvented attics shall be insulated with R-3.5 insulation.
- I. Cover ducts, exposed to outside weather, with Johns Manville 817 Series Spin-Glas rigid fiber glass board insulation, complying with ASTM C 612, Type II, rigid board, non-combustible, and meeting the following requirements:

1. Asbestos free.
2. Furnished in standard lengths and widths with ends cut square, conforming with the dimensional requirements of ASTM C 612, Types IA and 18.
3. Nominal density 817 6.0 pcf (96 kg/m³)
4. Maximum thermal conductivity, k (ksi), at 817 0.22 (0.032)
5. Rated maximum service temperature: not less than 450°F (232°C).
6. Material shall have a flame spread no greater than 25 and a smoke developed no greater than 50 when tested as in accordance with ASTM E 84, UL 723 or NFPA 255.
7. Vapor Retarder Jacketing: Aluminum foil reinforced with a glass fiber yarn and laminated to fire-resistant kraft complying with ASTM C 1136 Type II. Cover outside insulated duct with VentureClad 1577CW jacketing

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

system. Product shall have 10-year warranty.

8. UL listed, with UL compliance label on the carton.
9. Acceptable substitutions are by CertainTeed or Knauf.

2.4 FLEXIBLE NOISE BARRIER (SOUND LAGGING):

- A. Wrap ductwork as indicated on drawings for sound attenuation. Use Sound Seal B-10 LAG/QFA-3 loaded vinyl noise barrier with fibrous glass reinforced aluminum foil and 1" thick quilted fiberglass decoupler. The material shall have an STC rating of 29 and R factor of 4.
- B. Sound lagging shall be in addition to the regular thermal insulation or duct lining and shall be applied on top of regular insulation.

These linings, including coatings and adhesives, and insulation on exterior surfaces of pipes and ducts in building spaces used as air supply plenums, shall have a flame spread rating of 12.5 and a smoke developed rating of 19.5 as determined by an independent testing laboratory in accordance with ASTM Standard E 84.

- B. All dimensions shown on insulated ductwork shall be considered clear inside dimensions.

PART 3 – EXECUTION

3.1 SITE INSPECTION

- A. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.
- B. Verify that all materials and accessories can be installed in accordance with project drawings and specifications and material manufacturer's recommendations.
- C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

3.2 PREPARATION

- A. Ensure that insulation is clean, dry, and in good mechanical condition and that all factory-applied facings are intact and undamaged. Wet, dirty, or damaged insulation is not acceptable for installation.
- B. Ensure that pressure testing of piping, duct and fittings has been completed prior to installing insulation.

3.3 INSTALLATION

- A. General
 1. Install all insulation materials and accessories in accordance with manufacturer's published instructions and recognized industry practices to ensure that it will serve its intended purpose.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

2. Install insulation on piping/duct subsequent to painting, and acceptance tests.
 3. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over all piping surfaces.
- B. Fittings**
1. Wrap valves, fittings, and similar items in each piping system with wicking material to ensure a continuous path (100% coverage) for the removal of condensation.
 2. Seal all fitting joints with contractor supplied VaporWick Sealing Tape or approved vapor retarder mastic compound.
- C. Penetrations**
- Extend piping and duct insulation without interruption through walls, floors and similar piping or duct penetrations.

3.4 FIELD QUALITY ASSURANCE

- A. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with requirements herein to cover and protect insulation materials during installation.
- B. Replace any ceiling damage caused by condensation due to improper covering and sealing during the guarantee period of this job.

3.5 PROTECTION

- A. Replace damaged, removed or disturbed insulation with appropriate fiberglass insulation.
- B. The insulation contractor shall advise the general and/or the mechanical contractor as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.

3.6 SAFETY PRECAUTIONS

- A. Insulation contractor's employees shall be properly protected during installation of all insulation. Protection shall include proper attire when handling and applying insulation materials, and shall include (but not be limited to) disposable dust respirators, gloves, hard hats, and eye protection.
- B. The insulation contractor shall conduct all job site operations in compliance with applicable provisions of the Occupational Safety and Health Act, as well as with all state and/or local safety and health codes and regulations that may apply to the work.

END OF SECTION 23 07 00

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 23 09 13 - INSTRUMENTATION AND CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.
- B. The requirements in Section 20 00 50 shall also govern the work under this Section.
- C. Examine all drawings and data and coordinate the work of the Section with all related and adjoining work.

1.2 GENERAL REQUIREMENTS

- A. The Automatic Temperature Control Contractor shall furnish all material, engineering, and labor for the proper installation of a totally native BACnet-based system, based on a distributed control system in accordance with this specification. All building controllers, application, controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135-2001, BACnet. In other words, all workstations and controllers, including unitary controllers, shall be native BACnet devices. No gateways shall be used for communication to controllers installed under this section. The control system shall communicate directly with the existing Schneider Electric SmartStruxure BAS installed in the building at the present time.
- B. Provide all necessary BACnet-compliant hardware and software to meet the system's functional specifications. Provide an open communications system. System shall be capable of utilizing standard protocols as follows as well as be able to integrate third-party systems via existing vendor protocols. Systems shall be BACnet communication according to ASHRAE Standard DPC 135A/95.
- C. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.
- D. Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.
- E. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.
- F. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.
- G. Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.
- H. Provide complete manufacturer's specifications for all items that are supplied. Include

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

vendor name of every item supplied.

- I. Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning.
- J. Provide a comprehensive operator and technician training program as described herein. Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.
- K. The latest edition of the following standards and codes in effect and amended as of supplier's proposal date, and any applicable subsections thereof, shall govern design and selection of equipment and material supplied:
 - 1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
 - 2. ANSI/ASHRAE Standard 135-2001, BACnet.
 - 3. International Building Code (IBC), including local amendments.
 - 4. UL 916 Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
 - 5. National Electrical Code (NEC).
 - 6. FCC Part 15, Subpart J, Class A
- L. This Contractor shall include in his bid all costs associated with changing all of the room names and numbers at the end of the job from the names and numbers shown on the construction documents to a new set of room names and numbers, inclusive of all re-programming of all MEP and Fire protection systems, etc. Final room numbers will be provided by the Architect to the trade contractors at or around the date of Substantial Completion.

1.3 SCOPE

Provide all necessary BACnet compliant hardware and software to meet the system's functional specifications. Provide full color graphics. Control shall be furnished for the following:

Air Handling Unit Control
Air Cooled Condensing Unit Control
VAV Boxes with Hot Water Reheat Control
Return Air fan Control

1.4 BAS SERVER HARDWARE

The Schneider Electric BAS Sever Hardware is existing.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1.5 CONTROL WIRING

All Direct Digital Control wiring will be installed and terminated by the Temperature Control Contractor. Control wiring shall be defined as follows:

All wiring of electric/electronic/DDC temperature controls as shown on the drawings.

All temperature control panel wiring to terminal strips and field wiring from terminal strips to field mounted devices.

All wiring to the "Auto" side of the hand-off-auto switches on the units being controlled by the Temperature Control Contractor.

All wiring shall comply with National, State, and Local electrical codes. All wiring above the ceiling shall be plenum rated.

1.6 POWER WIRING

All power wiring will be installed and terminated by the Electrical Contractor. Power wiring shall be defined as follows:

Wiring of all devices and circuits carrying voltages greater than 120 V.

Wiring of power feeds to all disconnects starters, and electric motors.

Wiring of 120VAC power feeds to all temperature control panels.

Power wiring to 120 V single phase motors.

1.7 WORK UNDER OTHER SECTIONS

The following work shall be performed by the designated Contractor under the supervision of the Temperature Control Contractor.

The Heating, Ventilating, and Air Conditioning Contractor shall:

Install all domestic water flow monitoring valves and separable wells furnished by the Temperature Control Contractor.

Furnish and install all necessary piping connections required for flow indication devices.

Furnish and install all necessary valve pressure taps and water drain and overflow connections and piping.

Provide, on magnetic starters furnished, all necessary auxiliary contacts with buttons and switches in the required configurations.

The Electrical Contractor shall:

Be responsible for the work as outlined under power wiring.

The Sheet Metal Contractor shall:

Install all control dampers.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1.8 MATERIALS

All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems, and shall not be custom designed especially for this project. All components shall have been thoroughly tested and proven in actual use.

The control system shall be manufactured by Schneider Electric or equal by Automated Logic.

1.9 SUBMITTALS AND DRAWINGS

The following shall be submitted electronically for approval, prior to the system installation:

-Control drawings with detailed wiring diagrams, including bill of material and description of operation for all systems.

-Panel layouts.

-Valve Schedules showing size, configuration, capacity, and location.

-Data sheets for all control system components.

Upon completion of these installation and final system adjustments, the Control Contractor shall provide three (3) full sets of as-built drawings of the installation. Provide a set of As-Built drawings on CD. Files shall be in AutoCad and pdf format.

Connecticut High Performance Building Submittals:

Include supporting data showing energy, flow, gas, moisture, motion, pressure, and temperature instruments, where and if used in Project; and associated application for monitoring and control to satisfy requirements of Connecticut High Performance Building.

Indicate applicable locations and area coverage, control set points, description of control operation and other required information to satisfy submission requirements. Refer to Section 01 81 13.13 , Requirements for Connecticut High Performance Buildings.

Organize and identify standalone, supporting data for each Connecticut High Performance Building credit.

Project Connecticut High performance Building credits include the following:

1.10 CLOSEOUT SUBMITTALS

Operation and Maintenance Data: For DDC system to include in emergency, operation and maintenance manuals.

In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Project Record Drawings of as-built versions of submittal Shop Drawings provided in electronic PDF format.

Testing and commissioning reports and checklists of completed final versions of reports, checklists, and trend logs.

As-built versions of submittal Product Data.

Names, addresses, e-mail addresses and 24-hour telephone numbers of Installer and service representatives for DDC system and products.

Operator's manual with procedures for operating control systems including logging on and off, handling alarms, producing point reports, trending data, overriding computer control and changing set points and variables.

Programming manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.

Engineering, installation, and maintenance manuals that explain how to:

Design and install new points, panels, and other hardware.

Perform preventive maintenance and calibration.

Debug hardware problems.

Repair or replace hardware.

Documentation of all programs created using custom programming language including set points, tuning parameters, and object database.

Backup copy of graphic files, programs, and database on electronic media such as DVDs.

List of recommended spare parts with part numbers and suppliers.

Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.

Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation software, and graphics software.

Licenses, guarantees, and warranty documents.

Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.

Owner training materials.

MAINTENANCE MATERIAL SUBMITTALS

Furnish extra materials and parts that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Include product manufacturers' recommended parts lists for proper product operation over four year period following warranty period. Parts list shall be indicated for each year.

Furnish parts, as indicated by manufacturer's recommended parts list, for product operation during two year period following warranty period.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

QUALITY ASSURANCE

DDC System Manufacturer Qualifications:

- Nationally recognized manufacturer of DDC systems and products.
- DDC systems with similar requirements to those indicated for a continuous period of ten years within time of bid.
- DDC systems and products that have been successfully tested and in use on at least three past projects.
- Having complete published catalog literature, installation, operation and maintenance manuals for all products intended for use.
- Having full-time in-house employees for the following:
 - Product research and development.
 - Product and application engineering.
 - Product manufacturing, testing and quality control.
 - Technical support for DDC system installation training, commissioning and troubleshooting of installations.
 - Owner operator training.

DDC System Provider Qualifications:

- Authorized representative of, and trained by, DDC system manufacturer.
- In-place facility located within 60 miles of Project.
- Demonstrated past experience with installation of DDC system products being installed for period within five consecutive years before time of bid.
- Demonstrated past experience on five projects of similar complexity, scope and value.
- Each person assigned to Project shall have demonstrated past experience.
- Staffing resources of competent and experienced full-time employees that are assigned to execute work according to schedule.
- Service and maintenance staff assigned to support Project during warranty period.
- Product parts inventory to support on-going DDC system operation for a period of not less than five years after Substantial Completion.
- DDC system manufacturer's backing to take over execution of Work if necessary to comply with requirements indicated. Include Project-specific written letter, signed by manufacturer's corporate officer, if requested.

Testing Owner Qualifications: Member company of NETA or an NRTL.

Testing Owner's Field Supervisor: Certified by NETA to supervise on-site testing.

Welding Qualifications: Qualify procedures and personnel according to the following:

- AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
- AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1.13 WARRANTY

- A. The entire building control system shall be warranted for a period of eighteen months from the date the installation was accepted by the Owner. Any manufacturing defects arising during this period shall be corrected without cost to the Owner.

PART 2 - PRODUCTS

2.1 BUILDING CONTROLLER

- A. Provide a building controller. The building controller shall communicate with the existing Schneider Electric SmartStruxure front end through IP communication. The building controller shall be an Automation Server as manufactured by Schneider Electric or equal by Automated Logic.

B. General

1. Building controller shall incorporate as a minimum, the functions of a 3-way BACnet router. Controller shall route BACnet messages between the high-speed LAN (Ethernet 10/100MHz), at least 4 master slave token passing (MS/TP) LANs, a point-to-point (PTP – RS-232) connection and an on-board modem.
 - a. Each MS/TP LAN must be software configurable from 9.6 to 76.8Kbps.
 - b. The RJ-45 Ethernet connection must accept either 10Base-T or 100Base-TX BACnet over twisted pair cable (UTP).
 - c. The direct access port must be a female DB-9 connector supporting BAC-terminal at net temporary PTP connection of a portable BACnet operator terminal at 9.6 to 115.2 Kbps over RS-232 null modem cable.
2. Building controller shall be capable of providing global control strategies for the system based on information from any objects in the system regardless if the object is directly monitored by the controller or by another controller. The program that implements these strategies shall be completely flexible and user definable. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on-site or downloaded via remote communications are not acceptable. Changing global strategies via firmware changes is also unacceptable.
3. Programming shall be object-oriented using control function blocks, supporting DDC functions, 1000 Analog Values and 1000 Binary Values. All flowcharts shall be generated and automatically downloaded to controller. Programming tool shall be resident on workstation and the same tool used for all controllers.
4. Provide means to graphically view inputs and outputs to each program block in real-time as program is executing. This function may be performed via the operator's workstation or field computer.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

5. Building controller shall provide battery-backed real-time (hardware) clock functions.
6. Controller shall have a memory needed to ensure high performance and data reliability. Battery shall retain static RAM memory and real-time clock functions for a minimum of 1.5 years (cumulative).
7. Global control algorithms and automated control functions should execute via 32-bit processor.
8. Controller installation shall include memory-free gel-cell battery providing ongoing power conditioning and noise filtering for operation data integrity. It shall provide up to 5 minutes of powerless operation for orderly shutdown and data back-up.

C. BACnet Conformance

1. Building Controller shall as a minimum support Point-to-Point (PTP), MS/TP and Ethernet BACnet LAN types. It shall communicate directly via these BACnet LANs as a native BACnet device and shall support simultaneous routing functions between all supported LAN types. Global controller shall be a BACnet conformance class 3 device and support all BACnet services necessary to provide the following BACnet functional groups:

- a. Clock Functional Group
- b. Files Functional Group
- c. Reinitialize Functional Group
- d. Device Communications Functional Group
- e. Event Initiation Functional Group

2. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

3. Standard BACnet object types supported shall include as a minimum: Analog Value, Binary Value, Calendar, Device, File, Group, Notification Class, Program and Schedule object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

4. The Building Controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN. Must support interoperability on wide area networks (WANs) and campus area networks (CANs) and function as a BACnet Broadcast Management Device (BBMD).

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

D. Remote Communications

1. Provide all functions that will allow remote communications via modem to off-site locations. Include one modem along with all cabling necessary for installation for the system. It shall be possible to use the onboard modem or a separate modem connected via the PTP / RS-232 connection.
2. Provide Windows 7 software for off-site computer that allows operator to view and change all information associated with system on color graphic displays. Operator shall be able to change all parameters in this section from off-site location including all programming of building controllers and all programmable application controllers including all terminal unit controllers.
3. Building controller shall have capability to call out alarm conditions automatically. If desired, controller may also send encoded message to digital pager, text message or e-mail. If an alphanumeric pager is in use by the operator, building controller shall be capable of sending a text or numeric string of alarm description. All building controllers connected to the local LAN shall be capable of calling out alarm messages through one or more shared modems connected to one or more of the building controllers on the local LAN.
4. Building controller shall have capability to call a minimum of 20 different phone numbers. Numbers called may be controlled by type of alarm or time schedule.
5. The Owner shall provide standard voice-grade phone line for remote communication function.
6. Building controller and internal modem shall be capable of modem-to-modem baud rates of 33.6 Kbps minimum over standard voice-grade phone lines. Lower baud rates shall be selectable for areas where local phone company conditions require them.

E. Schedules

1. Each building controller shall support a minimum of 250 BACnet Schedule Objects and 250 BACnet Calendar Objects.

F. Logging Capabilities

1. Each building controller shall log as minimum 1000 trendlogs. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
2. Logs may be viewed both on-site or off-site via remote communication.
3. Building controller shall periodically upload trended data to networked operator's workstation for long term archiving if desired.
4. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

G. Alarm Generation

1. Alarms may be generated within the system for any object change of value or state either real or calculated. This includes things such as analog object value changes, binary object state changes, and various controller communication failures.
2. Each alarm may be dialed out as noted in paragraph 2 above.
3. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site via remote communications.
4. Controller must be able to handle up to 1500 alarm setups stored as BACnet event enrollment objects – system destination and actions individually configurable.

2.2 WEB INTERFACE

A. General

BAS supplier shall provide Web-based access to the system as part of standard installation. User must be able to access all displays of real-time data that are part of the BAS using a standard Web browser. Web browser shall tie into the network through Owner-supplied Ethernet network connection. Web page host shall be a separate device that resides on the BAS BACnet network, but is not the BAS server for the control system. BAS server must be a separate computer from the Web page host device to ensure data and system integrity. The Web page software shall not require a per-user licensing fee or annual fees. The Web page host must be able to support on average 50 simultaneous users with the ability to expand the system to accommodate an unlimited number of users.

B. Browser Technology

Browser shall be standard version of Microsoft Internet Explorer latest version, Firefox latest version and Safari latest version (on Mac OS X). No special vendor-supplied software shall be needed on computers running browser. All displays shall be viewable and the Web page host shall directly access real-time data from the BAS BACnet network. Data shall be displayed in real-time and update automatically without user interaction. User shall be able to change data on displays if logged in with the appropriate user name and password.

C. Communications

1. Web page host shall include two Ethernet network connections. One network connection shall be dedicated to BAS BACnet network and shall be used to gather real-time data from all the BACnet devices that form the BAS. This network shall communicate using BACnet, allowing the Web page host to gather data directly from units on the local LAN or from other projects connected over a WAN. This network shall also provide the connection to the BAS server for Web page generation.
2. The second Ethernet connection shall provide the physical connection to the Internet or an IP-based WAN. It shall be the port that is used for the browser to receive Web pages and data from the Web page host. The Web page host shall act as a physical barrier between the BAS network and the WAN or Internet connection that allows the browser to receive

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Web pages and data. The two separate network connections provide for a physical barrier to prevent raw BACnet traffic being exposed on the IP network.

3. The Web page host shall provide for complete isolation of the IP and BACnet networks by not routing networking packets between the two networks.
4. BAS BACnet Ethernet network shall be provided and installed by the BAS supplier. The Owner shall provide and incur any monthly charges of WAN/Internet connection.

D. Display of Data

1. Web page graphics shown on browser shall be replicas of the BAS displays. User shall need no additional training to understand information presented on Web pages when compared to what is shown on BAS displays. Web page displays shall include animation just as BAS displays. Fans shall turn, pilot lights shall blink, coils shall change colors, and so on.
2. Real-time data shall be shown on all browser Web pages. This data must be directly gathered using the BACnet network and automatically updated on browser Web page displays without any user action. Data on the browser shall automatically refresh as changes are detected without re-drawing the complete display.
3. It shall be possible for user from browser Web page to change data if the user is logged on with the appropriate password. Clicking on a button or typing in a new value shall change digital data. Using pull-down menus or typing in a new value shall change analog data.
4. Data displays shall be navigated using pushbuttons on the displays that are simply clicked on with the mouse to select a new display. Alternatively, the standard back and forward buttons of the browser can be used for display navigation.

E. Time Schedule Adjustment

1. Web access shall allow user to view and edit all schedules in the system. This includes standard, holiday and event schedules as described in BAS specification. Display of schedules shall show interaction of all schedules on a single display so user sees an overview of how all work together. User shall be able to edit schedules from this display.
2. Display of all three schedules must show all ON times for standard, holiday and event schedules in different colors on a given day. In addition, OFF times for each must also be shown in additional colors. User shall be able to select from standard calendar what days are to be scheduled and same display shall show all points and zones affected. User shall be able to set time for one day and select all days of the week that shall be affected as a recurrence of that same schedule for that given day.
3. Schedule list shall show all schedules currently defined. This list shall include all standard, holiday and event schedules. In addition, user shall be able to select a list that shows all scheduled points and zones.

F. Logging of Information

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

User shall use standard browser technology to view all trendlogs in system. User shall be able to view logged data in tabular form or graphical format. User shall be able to adjust time interval of logged data viewed and shall be able to adjust Y axis of data viewed in graphical format. User shall also be able to download data through the Web interface to local computer. Data shall be in CSV format.

G. Alarm Handling

Web interface shall display alarms as they occur. User shall be able to acknowledge alarms using browser technology. In addition, user shall be able to view history of alarm occurrence over a user-selected time frame. In addition, those alarms may be filtered for viewing per user-selected options. A single selection shall display all alarms that have not been acknowledged.

H. Web Page Generation

Web pages shall be automatically generated from the BAS displays that reside on the BAS server. User shall access Web page host through the network and shall initiate a Web page generation utility that automatically takes the BAS displays and turns them into Web pages. The Web pages generated are automatically installed on the Web page host for access using any computer's standard browser. Any system that requires use of an HTML editor for generation of Web pages shall not be considered.

I. Password Security and Activity Log

Access through Web browser shall utilize the same hierarchical security scheme as BAS system. User shall be asked to log on once the browser makes connection to Web page host. Once the user logs in, any and all changes that are made shall be tracked by the BAS system. The user shall be able to change only those items he or she has authority to change. A user activity report shall show any and all activity of the users who have logged in to the system, regardless of whether those changes were made using a browser or through the BAS workstation.

J. BACnet Communication

Web server shall directly communicate to all devices on the BAS network using BACnet protocol. No intermediate devices shall be necessary for BACnet communication.

2.3 TERMINAL UNIT APPLICATION CONTROLLERS

A. Provide one native BACnet application controller for each piece of unitary mechanical equipment that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller via MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of unit.

B. BACnet Conformance

1. Application controllers shall as a minimum support MS/TP BACnet LAN types. They shall communicate directly via this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. Application controllers shall be of

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

BACnet conformance class 3 and support all BACnet services necessary to provide the following BACnet functional groups:

- a. Files Functional Group
- b. Reinitialize Functional Group
- c. Device Communications Functional Group

2. Please refer to section 22.2, BACnet Functional Groups in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

3. Standard BACnet object types supported shall include as a minimum—Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

- C. Application controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5 VDC, 4–20 mA, dry contact signals and a minimum of 3 pulse inputs. Any input on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor. Controller shall include binary outputs on board with analog outputs as needed.
- D. All program sequences shall be stored on board controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using same programming tools as building controller and as described in operator workstation section. All programming tools shall be provided and installed as part of system.
- E. Application controller shall include support for intelligent room sensor. Display on room sensor shall be programmable at controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent room sensor.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

2.4 SENSORS/INPUT/OUTPUT DEVICES

A. Temperature Sensors

1. All temperature sensors to be solid state electronic, factory-calibrated to within 0.5°F, totally interchangeable with housing appropriate for application. Wall sensors to be installed as indicated on drawings. Mount 48 inches above finished floor. Duct sensors to be installed such that the sensing element is in the main air stream. Immersion sensors to be installed in wells provided by control contractor, but installed by mechanical contractor. Immersion wells shall be filled with thermal compound before installation of immersion sensors. Outside air sensors shall be installed away from exhaust or relief vents, not in an outside air intake and in a location that is in the shade most of the day.
 2. Room Sensor: All space temperature sensors shall be the thermistor types. The range shall be -30 to 100 degrees F, at a factory calibration point of 77 degrees F. Accuracy shall be +/- 0.36 degrees F, at calibration point. Sensors where identified, shall contain push-button bypass switches and shall be of the SS plate type when located in student accessible areas. Areas such as teachers lounges and Administrative areas shall be standard sensors with bias levers and push-button bypass switches.
 3. All space temperature sensors shall be the thermistor types. The range shall be -30 to 100 degrees F, at a factory calibration point of 77 degrees F. Accuracy shall be +/- 0.36 degrees F, at calibration point. Sensors where identified, shall contain push-button bypass switches and shall be of the SS plate type when located in student accessible areas. Areas such as teachers lounges and Administrative areas shall be standard sensors with bias levers and push-button bypass switches.
- B. Rigid Element: Single point duct temperature sensors shall be the thermistor type. The range shall be 32 to 158 degrees F, with a factory calibration point of 77 degrees F. Accuracy shall be +/- 0.36 degrees F, at calibration point. These sensors shall be used in unit discharge and well sensor.
- C. The outside air temperature sensor shall be the thermistor type. The range shall be -30 to 140 degrees F and have an accuracy, at the calibration point, of +/- 0.36 degrees.
- D. Differential Pressure Switches: The differential pressure range of the switches shall be selected to suit the application, and shall have an adjustable setpoint. The switches shall have SPDT contacts. Dwyer AFS-262 for air and Penn P74 for liquid, or equal. The switches shall be mounted with the diagram in a vertical plan.
- E. Current sensors shall have: fixed setpoint, .25A to 200A, shall be 100% solid-state, no moving parts to fail Veris series H-800 or equal.
- F. Stainless Steel Pressure Transmitter: Utilizes a thin film strain-gauge bridge and stainless steel diaphragm to provide a highly accurate, stable means of measuring pressures up to 2000psig. Splash-proof cable connections protect the wiring, allowing the model PTX1 to be mounted near the medium being measured.
- G. Two-Position Room Thermostat: Line or low voltage tamperproof without thermometers, concealed adjustment setpoints, sensing element (liquid charged or bimetal). Cooling ther-

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

mostats to have sub-base with fan on-off and off-cool switches.

- H. Low limit Thermostat: Shall have heavy-duty temperature cut-out controls incorporating a vapor-charged sensing element. It shall have a four-wire, two-circuit contact block that contains two isolated sets of contacts. The contacts are designed to transfer at setpoint so that when the main contact opens, the auxiliary contact closes simultaneously. Shall be manual reset. Temperature range of 15-55 degrees F with averaging capillary Penn model A70HA-1 or equal.

- I. Two and Three- Way Screwed Valves:

Valves ½" through 2" shall be forged brass body with nickel plating, NPT screw type. The operating temperature range shall be 0 degrees to 212 degrees F/

The valves shall have an ISO type 4 bolt flange for mounting actuator in any orientation parallel or perpendicular to the pipe. A non-metallic thermal isolation adapter shall separate flange from actuator with high temperature materials rated for continual use at greater than application temperature. Valve assemblies without thermal isolation as described are not acceptable.

The isolation adapter shall also provide stable direct coupled mechanical connection between the valve body and actuator and prevent lateral or rotational forces from affecting the stem and its packing O-rings.

All control ball valves shall be furnished with a stainless steel ball & stem and fiberglass reinforced Teflon seats and seals. The valves shall have a blow out proof stem design. Each valve shall be tested by the valve manufacturer.

Flow type for modulating two-way valves shall be equal percentage. All control ball valves shall have a flow characterizing disc in the inlet of the valve to provide this equal percentage flow response. Three-way valves shall have equal percentage control port. They shall have a modified linear bypass port which will yield 70% of the flow of the A port. The total flow remains near constant. Three-way valves shall be applicable for both mixing and diverting.

Characterizing disc shall be held securely by a keyed ring.

The stem packing shall consist of 2 O-rings designed for on-off modulating service and requiring no maintenance.

Manufacturer shall provide a eighteen (18) unconditional warranty following the date of owner's acceptance of job. The warranty shall include all parts, labor, and associated costs incurred by the manufacturer to provide factory authorized on-site service.

- K. Valve Actuators:

The actuator manufacturer shall have ISO 9001 quality certification.

Actuators shall be Underwriters Laboratories Listed under Standard 873 and Canadian Standards Association Class 4813 02.

Actuators used near outdoor air streams shall have NEMA type 2 (IP54) housing for water and moisture resistance.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Actuators shall be direct coupled to the valve with a single screw.

Actuators shall be applied according to the manufacturer's specifications.

The valve actuator shall be capable of providing the minimum torque required for proper valve close-off for the required application.

Each actuator shall have current limiting circuitry or microprocessor overload protection incorporated in its design to prevent damage to the actuator.

Applications that require fail safe operation of the valve assembly shall use actuators with mechanical spring return.

The actuator shall be proportional, floating (Tri-state), or two position with spring return as called out in the control sequence of operation. All proportional valves shall be positive positioning, and respond to a 2-10 VDC or 4-20mA with load resistor. These proportional units will each have position feedback signal corresponding to the actual valve position which can be wired back to the control system.

All control valve shall have a visual position indicator and an attached 3 foot cable for easy installation to a junction box. Manufacturer shall provide a eighteen months of unconditional warranty following the date of beneficial use.

L. Damper Actuators: Shall be of the electronic type and shall be either fully proportional spring return or two-position spring return as described in the sequence of operation and as shown on the control drawings. Damper operators shall be located outside of the air stream whenever possible. Damper actuators shall be sufficient size to operate their respective dampers effectively.

- M. Control Dampers: Will be furnished by the Temperature Control Contractor and shall be single or multiple blade, as required. All dampers frames are to be constructed of #13 gauge galvanized sheet metal with flanges for duct mounting. Where dampers sizes are not indicated on the plans, dampers shall be properly sized by the Temperature Control Contractor, for minimum pressure drop, from two sheets of #22 gauge galvanized sheet metal spot-welded together and not exceeding 6" replaceable seals along with inside surface of top, bottom, sides of the frames, and along each blade edge.

Air leakage through the damper shall not exceed ½ of 1 percent of system capacity at 4" water static. Characteristics will be reviewed by the Architect/Engineer prior to approving dampers.

- N. Condensation Sensors: Will be furnished by the Temperature Control Contractor and located immediately upstream of the chilled beam supply water header within the chilled beam enclosure. Sauter Model EGH 102 dew point monitor and transducer shall be used. Thoroughly clean surface of pipe prior to installation.
- O. Occupancy Sensors: Will be furnished by the Temperature Control Contractor for the Lecture Hall and Multy-Purpose room only. All other occupancy sensors will be provided and installed by the electrical contractor with auxiliary contacts for monitoring by the DDC system. The occupancy sensors provided by the TCC will be ceiling or wall mounted and have passive infrared dual sensing technology.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

O. Humidity Sensors: shall be accurate to +/- 3% from 20% RH to 80% RH.

PART 3 - EXECUTION

EXAMINATION

Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

Verify compatibility with and suitability of substrates.

Examine roughing-in for products to verify actual locations of connections before installation.

Examine roughing-in for instruments installed in piping to verify actual locations of connections before installation.

Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

Examine walls, floors, roofs, and ceilings for suitable conditions where product will be installed.

Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

Proceed with installation only after unsatisfactory conditions have been corrected.

DDC SYSTEM INTERFACE WITH OTHER SYSTEMS AND EQUIPMENT

Communication Interface to Equipment with Integral Controls:

DDC system shall have communication interface with equipment having integral controls and having a communication interface for remote monitoring or control.

Equipment to Be Connected:

Water cooled Chiller

Pumps

Interface with occupancy sensors specified under Div 26.

CONTROL DEVICES FOR INSTALLATION BY INSTALLERS

Deliver selected control devices, specified in indicated HVAC instrumentation and control device Sections, to identified equipment and systems manufacturers for factory installation and to identified installers for field installation.

Deliver the following to duct fabricator and Installer for installation in ductwork. Include installation instructions to Installer and supervise installation for compliance with requirements.

DDC control dampers

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Airflow sensors and switches,
Pressure sensors

Deliver the following to plumbing and HVAC piping installers for installation in piping. Include installation instructions to Installer and supervise installation for compliance with requirements.

DDC control valves,
Pipe-mounted flow meters
Pipe-mounted sensors, switches and transmitters.
Tank-mounted sensors, switches and transmitters.
Pipe- and tank-mounted thermowells.

GENERAL INSTALLATION REQUIREMENTS

Install products to satisfy more stringent of all requirements indicated.

Install products level, plumb, parallel, and perpendicular with building construction.

Support products, tubing, piping wiring and raceways. Brace products to prevent lateral movement and sway or a break in attachment.

If codes and referenced standards are more stringent than requirements indicated, comply with requirements in codes and referenced standards.

Fabricate openings and install sleeves in ceilings, floors, roof, and walls required by installation of products. Before proceeding with drilling, punching, and cutting, check for concealed work to avoid damage. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

Firestop penetrations made in fire-rated assemblies.

Seal penetrations made in acoustically rated assemblies

Welding Requirements:

Restrict welding and burning to supports and bracing.

No equipment shall be cut or welded without approval. Welding or cutting will not be approved if there is risk of damage to adjacent Work.

Welding, where approved, shall be by inert-gas electric arc process and shall be performed by qualified welders according to applicable welding codes.

If requested on-site, show satisfactory evidence of welder certificates indicating ability to perform welding work intended.

Fastening Hardware:

Stillson wrenches, pliers, and other tools that damage surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening fasteners.

Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Lubricate threads of bolts, nuts and screws with graphite and oil before assembly.

If product locations are not indicated, install products in locations that are accessible and that will permit service and maintenance from floor, equipment platforms, or catwalks without removal of permanently installed furniture and equipment.

OPERATOR WORKSTATION INSTALLATION

The Schneider Electric SmartStruxure Operator Workstation is existing

Install operator workstation at location directed by the Owner.
Install multiple-receptacle power strip with cord for use in connecting multiple workstation components to a single duplex electrical power receptacle.
Install software on workstation and verify software functions properly.
Develop Project-specific graphics, trends, reports, logs and historical database.

Color Graphics Application:

Use system schematics indicated as starting point to create graphics.
Develop Project-specific library of symbols for representing system equipment and products.
Incorporate digital images of Project-completed installation into graphics where beneficial to enhance effect.
Submit sketch of graphic layout with description of all text for each graphic for Owner's review before creating graphic using graphics software.
Seek Owner's input in graphics development once using graphics software.
Final editing shall be done on-site with Owner's review and feedback.
Refine graphics as necessary for Owner acceptance.
On receiving Owner's acceptance, print a hard copy for inclusion in operation and maintenance manual. Prepare a scanned copy PDF file of each graphic and include with softcopy of DDC system operation and maintenance manual.

CONTROLLER INSTALLATION

Install controllers in enclosures to comply with indicated requirements.

Install controller with latest version of applicable software and configure to execute requirements indicated.

Test and adjust controllers to verify operation of connected I/O to achieve performance indicated requirements while executing sequences of operation.

Installation of Network Controllers:

Quantity and location of network controllers shall be determined by DDC system manufacturer to satisfy requirements indicated.
Install controllers in a protected location that is easily accessible by operators.

Installation of Programmable Application Controllers:

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Quantity and location of programmable application controllers shall be determined by DDC system manufacturer to satisfy requirements indicated.
Install controllers in a protected location that is easily accessible by operators.

Application-Specific Controllers:

Quantity and location of application-specific controllers shall be determined by DDC system manufacturer to satisfy requirements indicated.
For controllers not mounted directly on equipment being controlled, install controllers in a protected location that is easily accessible by operators.

ENCLOSURES INSTALLATION

Install the following items in enclosures, to comply with indicated requirements:

- Gateways.
- Routers.
- Controllers.
- Electrical power devices.
- Relays.
- Accessories.
- Instruments.
- Actuators

Install continuous and fully accessible wireways to connect conduit, wire, and cable to multiple adjacent enclosures. Wireway used for application shall have protection equal to NEMA 250 rating of connected enclosures.

ELECTRIC POWER CONNECTIONS

Connect electrical power to DDC system products requiring electrical power connections.

Design of electrical power to products not indicated with electric power is delegated to DDC system provider and installing trade. Work shall comply with NFPA 70 and other requirements indicated.

IDENTIFICATION

Identify system components, wiring, cabling, and terminals

Install engraved phenolic nameplate with unique identification on face for each of the following:

- Operator workstation.
- Server.
- Printer.
- Gateway.
- Router.
- Protocol analyzer.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

DDC controller.
Enclosure.
Electrical power device.
Accessory.

Install engraved phenolic nameplate with unique instrument identification on face of each instrument connected to a DDC controller.

Install engraved phenolic nameplate with identification on face of each control damper and valve actuator connected to a DDC controller.

Where product is installed above accessible tile ceiling, also install matching engraved phenolic nameplate with identification on face of ceiling grid located directly below.

Where product is installed above an inaccessible ceiling, also install engraved phenolic nameplate with identification on face of access door directly below.

Warning Labels:

Shall be permanently attached to equipment that can be automatically started by DDC control system.
Shall be located in highly visible location near power service entry points.

NETWORK INSTALLATION

Install fiber-optic cable when connecting between the following network devices

Operator workstations.
Operator workstations and network controllers.
Network controllers.

Install copper or fiber-optic cable when connecting between the following network devices located in same building:

Operator workstations.
Operator workstations and network controllers.
Network controllers.

Install copper cable when connecting between the following:

Gateways.
Gateways and network controllers or programmable application controllers.
Routers.
Routers and network controllers or programmable application controllers.
Network controllers and programmable application controllers.
Programmable application controllers.
Programmable application controllers and application-specific controllers.
Application-specific controllers.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Install network cable in continuous raceway.

Where indicated on Drawings, cable trays may be used for copper cable in lieu of conduit.

NETWORK NAMING AND NUMBERING

Coordinate with the Owner and provide unique naming and addressing for networks and devices.

ASHRAE 135 Networks:

MAC Address:

Every network device shall have an assigned and documented MAC address unique to its network.

Ethernet Networks: Document MAC address assigned at its creation.

ARCNET or MS/TP networks: Assign from 00 to 64.

Network Numbering:

Assign unique numbers to each new network.

Provide ability for changing network number through device switches or operator interface.

DDC system, with all possible connected LANs, can contain up to 65,534 unique networks.

Device Object Identifier Property Number:

Assign unique device object identifier property numbers or device instances for each device network.

Provide for future modification of device instance number by device switches or operator interface.

LAN shall support up to 4,194,302 unique devices.

Device Object Name Property Text:

Device object name property field shall support 32 minimum printable characters.

Assign unique device "Object Name" property names with plain-English descriptive names for each device.

Example 1: Device object name for device controlling boiler plant at Building 1000 would be "HW System B1000."

Example 2: Device object name for a VAV terminal unit controller could be "VAV unit 102".

Object Name Property Text for Other Than Device Objects:

Object name property field shall support 32 minimum printable characters.

Assign object name properties with plain-English names descriptive of application.

Example 1: "Zone 1 Temperature."

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Example 2 "Fan Start and Stop."

Object Identifier Property Number for Other Than Device Objects:

Assign object identifier property numbers according to drawings.

If not indicated, object identifier property numbers may be assigned at Installer's discretion but must be approved by the Owner in advance, be documented and be unique for like object types within device.

CONTROL WIRE, CABLE AND RACEWAYS INSTALLATION

Comply with NECA 1.

Comply with TIA 568-C.1.

Wiring Method: Install cables in raceways and cable trays. Conceal raceway and cables except in unfinished spaces.

Install plenum cable in environmental air spaces, including plenum ceilings.

Comply with requirements for cable trays specified in Section 260500 "Basic Electrical Materials and Methods"

Comply with requirements for raceways and boxes specified in Section 260500 "

Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

Field Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

Conduit Installation:

Install conduit expansion joints where conduit runs exceed **200 feet**, and conduit crosses building expansion joints.

Coordinate conduit routing with other trades to avoid conflicts with ducts, pipes and equipment and service clearance.

Maintain at least **3-inch** separation where conduits run axially above or below ducts and pipes.

Limit above-grade conduit runs to **100 feet** without pull or junction box.

Do not install raceways or electrical items on any "explosion-relief" walls, or rotating equipment.

Do not fasten conduits onto the bottom side of a metal deck roof.

Flexible conduit is permitted only where flexibility and vibration control is required.

Limit flexible conduit to **3 feet** long.

Conduit shall be continuous from outlet to outlet, from outlet to enclosures, pull and junction boxes, and shall be secured to boxes in such manner that each system shall be electrically continuous throughout.

Direct bury conduits underground or install in concrete-encased duct bank where indicated.

Use rigid, nonmetallic, Schedule 80 PVC.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Provide a burial depth according to NFPA 70, but not less than **24 inches**.

Secure threaded conduit entering an instrument enclosure, cabinet, box, and trough, with a locknut on outside and inside, such that conduit system is electrically continuous throughout. Provide a metal bushing on inside with insulated throats. Locknuts shall be the type designed to bite into the metal or, on inside of enclosure, shall have a grounding wedge lug under locknut.

Conduit box-type connectors for conduit entering enclosures shall have an insulated throat.

Connect conduit entering enclosures in wet locations with box-type connectors or with watertight sealing locknuts or other fittings.

Offset conduits where entering surface-mounted equipment.

Seal conduit runs used by sealing fittings to prevent the circulation of air for the following:

Conduit extending from interior to exterior of building.

Conduit extending into pressurized duct and equipment.

Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.

Wire and Cable Installation:

Cables serving a common system may be grouped in a common raceway. Install control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.

Install cables with protective sheathing that is waterproof and capable of withstanding continuous temperatures of 90 deg C with no measurable effect on physical and electrical properties of cable.

Provide shielding to prevent interference and distortion from adjacent cables and equipment.

Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.

UTP Cable Installation:

Comply with TIA 568-C.2.

Do not untwist UTP cables more than **1/2 inch** from the point of termination, to maintain cable geometry.

Identify each wire on each end and at each terminal with a number-coded identification tag.

Each wire shall have a unique tag.

Provide strain relief.

Terminate wiring in a junction box.

Clamp cable over jacket in junction box.

Individual conductors in the stripped section of the cable shall be slack between the clamping point and terminal block.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Terminate field wiring and cable not directly connected to instruments and control devices having integral wiring terminals using terminal blocks.

Install signal transmission components according to IEEE C2, REA Form 511a, NFPA 70, and as indicated.

Keep runs short. Allow extra length for connecting to terminal boards. Do not bend flexible coaxial cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.

Ground wire shall be copper and grounding methods shall comply with IEEE C2. Demonstrate ground resistance.

Wire and cable shall be continuous from terminal to terminal without splices.

Use insulated spade lugs for wire and cable connection to screw terminals.

Use shielded cable to transmitters.

Use shielded cable to temperature sensors.

Perform continuity and meager testing on wire and cable after installation.

Do not install bruised, kinked, scored, deformed, or abraded wire and cable. Remove and discard wire and cable if damaged during installation, and replace it with new cable.

Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

Protection from Electro-Magnetic Interference (EMI): Provide installation free of (EMI). As a minimum, comply with the following requirements:

Comply with BICSI TDMM and TIA 569-C for separating unshielded cable from potential EMI sources, including electrical power lines and equipment.

Separation between open cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

Electrical Equipment Rating Less Than 2 kVA: A minimum of **5 inches**.

Electrical Equipment Rating between 2 and 5 kVA: A minimum of **12 inches**.

Electrical Equipment Rating More Than 5 kVA: A minimum of **24 inches**.

Separation between cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

Electrical Equipment Rating Less Than 2 kVA: A minimum of **2-1/2 inches**.

Electrical Equipment Rating between 2 and 5 kVA: A minimum of **6 inches**.

Electrical Equipment Rating More Than 5 kVA: A minimum of **12 inches**.

Separation between cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

Electrical Equipment Rating Less Than 2 kVA: No requirement.

Electrical Equipment Rating between 2 and 5 kVA: A minimum of **3 inches**.

Electrical Equipment Rating More Than 5 kVA: A minimum of **6 inches**.

Separation between Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of **48 inches**.

Separation between Cables and Fluorescent Fixtures: A minimum of **5 inches**.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

FIBER-OPTIC CABLE SYSTEM INSTALLATION

Comply with TIA 568-C.3, except where requirements indicated are more stringent.

Raceway Installation:

- Install continuous raceway for routing fiber-optic cables.
- Install raceways continuously between pull boxes and junction boxes. Raceways shall enter and be secured to enclosures.
- Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- Install no more than the equivalent of two 90-degree bends in any pathway run. Support within **12 inches** of changes in direction. Use long radius elbows for all fiber-optic cables.
- Entire raceway shall be complete and raceway interior cleaned before installation of fiber-optic cables.
- Securely fasten raceway to building structure using clamps and clips designed for purpose.
- Install nylon or polyethylene pulling line in raceways. Clearly label as "pulling line," indicating source and destination.

Fiber-Optic Cable Installation:

- Route cables as efficiently as possible, minimizing amount of cable required.
- Continuously lubricate cables during pulling-in process.
- Do not exceed maximum pulling tensions provided by cable manufacturer. Monitor cable pulling tension with a mechanical tension meter.
- Arrange cables passing through pull boxes to obtain maximum clearance among cables within box.
- As cables emerge from intermediate point pull boxes, coil cable in a figure eight pattern with loops not less than **24 inches** in diameter.
- Terminate fiber-optic cables in a fiber-optic splice organizer cabinet, unless connected equipment can accept fiber-optic cables directly. Terminate cables with connectors.
- Install and connect appropriate opto-electronic equipment and fiber jumper cables between opto-electronic equipment and fiber-optic cable system to DDC system fiber-optic cable system. Verify interface compatibility.

Cable and Raceway Identification:

- Label cables at both ends. Labels shall be typed, not handwritten.
- Mark raceways at each pull box indicating the type and number of cables within.

DDC SYSTEM I/O CHECKOUT PROCEDURES

- Check installed products before continuity tests, leak tests and calibration.
- Check instruments for proper location and accessibility.
- Check instruments for proper installation on direction of flow, elevation, orientation, insertion depth, or other applicable considerations that will impact performance.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Check instrument tubing for proper isolation, fittings, slope, dirt legs, drains, material and support.

For pneumatic products, verify that air supply for each product is properly installed.

Control Damper Checkout:

For pneumatic dampers, verify that pressure gages are provided in each air line to damper actuator and positioner.

Verify that control dampers are installed correctly for flow direction.

Verify that proper blade alignment, either parallel or opposed, has been provided.

Verify that damper frame attachment is properly secured and sealed.

Verify that damper actuator and linkage attachment is secure.

Verify that actuator wiring is complete, enclosed and connected to correct power source.

Verify that damper blade travel is unobstructed.

Control Valve Checkout:

For pneumatic valves, verify that pressure gages are provided in each air line to valve actuator and positioner.

Verify that control valves are installed correctly for flow direction.

Verify that valve body attachment is properly secured and sealed.

Verify that valve actuator and linkage attachment is secure.

Verify that actuator wiring is complete, enclosed and connected to correct power source.

Verify that valve ball, disc or plug travel is unobstructed.

After piping systems have been tested and put into service, but before insulating and balancing, inspect each valve for leaks. Adjust or replace packing to stop leaks. Replace the valve if leaks persist.

Instrument Checkout:

Verify that instrument is correctly installed for location, orientation, direction and operating clearances.

Verify that attachment is properly secured and sealed.

Verify that conduit connections are properly secured and sealed.

Verify that wiring is properly labeled with unique identification, correct type and size and is securely attached to proper terminals.

Inspect instrument tag against approved submittal.

For instruments with tubing connections, verify that tubing attachment is secure and isolation valves have been provided.

For flow instruments, verify that recommended upstream and downstream distances have been maintained.

For temperature instruments:

Verify sensing element type and proper material.

Verify length and insertion.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

DDC SYSTEM I/O ADJUSTMENT, CALIBRATION AND TESTING:

Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.

Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.

For each analog instrument, make a three-point test of calibration for both linearity and accuracy.

Equipment and procedures used for calibration shall comply with instrument manufacturer's written instructions.

Provide diagnostic and test equipment for calibration and adjustment.

Field instruments and equipment used to test and calibrate installed instruments shall have accuracy at least twice the instrument accuracy being calibrated. An installed instrument with an accuracy of 1 percent shall be checked by an instrument with an accuracy of 0.5 percent.

Calibrate each instrument according to instrument instruction manual supplied by manufacturer.

If after calibration indicated performance cannot be achieved, replace out-of-tolerance instruments.

Comply with field testing requirements and procedures indicated by ASHRAE's Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements, and to supplement requirements indicated.

Analog Signals:

Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.

Check analog current signals using a precision current meter at zero, 50, and 100 percent.

Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

Digital Signals:

Check digital signals using a jumper wire.

Check digital signals using an ohmmeter to test for contact making or breaking.

Control Dampers:

Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed and back to 100 percent open.

Stroke control dampers with pilot positioners. Adjust damper and positioner following manufacturer's recommended procedure, so damper is 100 percent closed, 50 percent closed and 100 percent open at proper air pressure.

Check and document open and close cycle times for applications with a cycle time less than 30 seconds.

For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Control Valves:

- Stroke and adjust control valves following manufacturer's recommended procedure, from 100 percent open to 100 percent closed and back to 100 percent open.
- Stroke control valves with pilot positioners. Adjust valve and positioner following manufacturer's recommended procedure, so valve is 100 percent closed, 50 percent closed and 100 percent open at proper air pressures.
- Check and document open and close cycle times for applications with a cycle time less than 30 seconds.
- For control valves equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

Meters: Check sensors at zero, 50, and 100 percent of Project design values.

Sensors: Check sensors at zero, 50, and 100 percent of Project design values.

Switches: Calibrate switches to make or break contact at set points indicated.

Transmitters:

- Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.
- Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistant source.

DDC SYSTEM CONTROLLER CHECKOUT

Verify power supply.

- Verify voltage, phase and hertz.
- Verify that protection from power surges is installed and functioning.
- Verify that ground fault protection is installed.
- If applicable, verify if connected to UPS unit.
- If applicable, verify if connected to a backup power source.
- If applicable, verify that power conditioning units, transient voltage suppression and high-frequency noise filter units are installed.

Verify that wire and cabling is properly secured to terminals and labeled with unique identification.

Verify that spare I/O capacity is provided.

DDC CONTROLLER I/O CONTROL LOOP TESTS

Testing:

- Test every I/O point connected to DDC controller to verify that safety and operating control set points are as indicated and as required to operate controlled system safely and at optimum performance.
- Test every I/O point throughout its full operating range.
- Test every control loop to verify operation is stable and accurate.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Adjust control loop proportional, integral and derivative settings to achieve optimum performance while complying with performance requirements indicated. Document testing of each control loop's precision and stability via trend logs.

Test and adjust every control loop for proper operation according to sequence of operation.

Test software and hardware interlocks for proper operation. Correct deficiencies.

Operate each analog point at the following:

Upper quarter of range.

Lower quarter of range.

At midpoint of range.

Exercise each binary point.

For every I/O point in DDC system, read and record each value at operator workstation, at DDC controller and at field instrument simultaneously. Value displayed at operator workstation, at DDC controller and at field instrument shall match.

Prepare and submit a report documenting results for each I/O point in DDC system and include in each I/O point a description of corrective measures and adjustments made to achieve desired results.

DDC SYSTEM VALIDATION TESTS

Perform validation tests before requesting final review of system. Before beginning testing, first submit Pretest Checklist and Test Plan.

After approval of Test Plan, execute all tests and procedures indicated in plan.

After testing is complete, submit completed test checklist.

Pretest Checklist: Submit the following list with items checked off once verified:

Detailed explanation for any items that are not completed or verified.

Required mechanical installation work is successfully completed and HVAC equipment is working correctly.

HVAC equipment motors operate below full-load amperage ratings.

Required DDC system components, wiring, and accessories are installed.

Installed DDC system architecture matches approved Drawings.

Control electric power circuits operate at proper voltage and are free from faults.

Required surge protection is installed.

DDC system network communications function properly, including uploading and downloading programming changes.

Using BACnet protocol analyzer, verify that communications are error free.

Each controller's programming is backed up.

Equipment, products, tubing, wiring cable and conduits are properly labeled.

All I/O points are programmed into controllers.

Testing, adjusting and balancing work affecting controls is complete.

Dampers and actuators zero and span adjustments are set properly.

Each control damper and actuator goes to failed position on loss of power.

Valves and actuators zero and span adjustments are set properly.

Each control valve and actuator goes to failed position on loss of power.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Meter, sensor and transmitter readings are accurate and calibrated.
Control loops are tuned for smooth and stable operation.
View trend data where applicable.
Each controller works properly in standalone mode.
Safety controls and devices function properly.
Interfaces with fire-alarm system function properly.
Electrical interlocks function properly.
Operator workstations and other interfaces are delivered, all system and database software is installed, and graphic are created.
Record Drawings are completed.

Test Plan:

Prepare and submit a validation test plan including test procedures for performance validation tests.
Test plan shall address all specified functions of DDC system and sequences of operation.
Explain detailed actions and expected results to demonstrate compliance with requirements indicated.
Explain method for simulating necessary conditions of operation used to demonstrate performance.
Include a test checklist to be used to check and initial that each test has been successfully completed.
Submit test plan documentation 20 business days before start of tests.

Validation Test:

Verify operating performance of each I/O point in DDC system.

- Verify analog I/O points at operating value.
- Make adjustments to out-of-tolerance I/O points.
- Identify I/O points for future reference.
- Simulate abnormal conditions to demonstrate proper function of safety devices.
- Replace instruments and controllers that cannot maintain performance indicated after adjustments.

Simulate conditions to demonstrate proper sequence of control.
Readjust settings to design values and observe ability of DDC system to establish desired conditions.

After 24 Hours following Initial Validation Test:

- Re-check I/O points that required corrections during initial test.
- Identify I/O points that still require additional correction and make corrections necessary to achieve desired results.

After 24 Hours of Second Validation Test:

- Re-check I/O points that required corrections during second test.
- Continue validation testing until I/O point is normal on two consecutive tests.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Completely check out, calibrate, and test all connected hardware and software to ensure that DDC system performs according to requirements indicated.

After validation testing is complete, prepare and submit a report indicating all I/O points that required correction and how many validation re-tests it took to pass. Identify adjustments made for each test and indicate instruments that were replaced.

DDC SYSTEM WIRELESS NETWORK VERIFICATION

DDC system Installer shall design wireless DDC system networks to comply with performance requirements indicated.

Installer shall verify wireless network performance through field testing and shall document results in a field test report.

Testing and verification of all wireless devices shall include, but not be limited to, the following:

- Speed.
- Online status.
- Signal strength.

FINAL REVIEW

Submit written request to Architect and Construction Manager when DDC system is ready for final review. Written request shall state the following:

DDC system has been thoroughly inspected for compliance with contract documents and found to be in full compliance.

DDC system has been calibrated, adjusted and tested and found to comply with requirements of operational stability, accuracy, speed and other performance requirements indicated.

DDC system monitoring and control of HVAC systems results in operation according to sequences of operation indicated.

DDC system is complete and ready for final review.

Review by Architect and Construction Manager shall be made after receipt of written request. A field report shall be issued to document observations and deficiencies.

Take prompt action to remedy deficiencies indicated in field report and submit a second written request when all deficiencies have been corrected. Repeat process until no deficiencies are reported.

Should more than two reviews be required, DDC system manufacturer and Installer shall compensate entity performing review for total costs, labor and expenses, associated with third and subsequent reviews. Estimated cost of each review shall be submitted and approved by DDC system manufacturer and Installer before making the review.

Prepare and submit closeout submittals when no deficiencies are reported.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

A part of DDC system final review shall include a demonstration to parties participating in final review.

Provide staff familiar with DDC system installed to demonstrate operation of DDC system during final review.

Provide testing equipment to demonstrate accuracy and other performance requirements of DDC system that is requested by reviewers during final review.

Demonstration shall include, but not be limited to, the following:

Accuracy and calibration of 20 I/O points randomly selected by reviewers. If review finds that some I/O points are not properly calibrated and not satisfying performance requirements indicated, additional I/O points may be selected by reviewers until total I/O points being reviewed that satisfy requirements equals quantity indicated.

HVAC equipment and system hardwired and software safeties and life-safety functions are operating according to sequence of operation. Up to 20 I/O points shall be randomly selected by reviewers. Additional I/O points may be selected by reviewers to discover problems with operation.

Correct sequence of operation after electrical power interruption and resumption after electrical power is restored for randomly selected HVAC systems.

Operation of randomly selected dampers and valves in normal-on, normal-off and failed positions.

Reporting of alarm conditions for randomly selected alarms, including different classes of alarms, to ensure that alarms are properly received by operators and operator workstations.

Trends, summaries, logs and reports set-up for Project.

For up to three HVAC systems randomly selected by reviewers, use graph trends to show that sequence of operation is executed in correct manner and that HVAC systems operate properly through complete sequence of operation including different modes of operations indicated. Show that control loops are stable and operating at set points and respond to changes in set point of 20 percent or more.

Software's ability to communicate with controllers, operator workstations, uploading and downloading of control programs.

Software's ability to edit control programs off-line.

Data entry to show Project-specific customizing capability including parameter changes.

Step through penetration tree, display all graphics, demonstrate dynamic update, and direct access to graphics.

Execution of digital and analog commands in graphic mode.

Spreadsheet and curve plot software and its integration with database.

Online user guide and help functions.

Multitasking by showing different operations occurring simultaneously on four quadrants of split screen.

System speed of response compared to requirements indicated.

For Each Controller:

Memory: Programmed data, parameters, trend and alarm history collected during normal operation is not lost during power failure.

Operator Interface: Ability to connect directly to each type of digital controller with a portable operator workstation and PDA. Show that maintenance personnel interface tools perform as indicated in manufacturer's technical literature.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Standalone Ability: Demonstrate that controllers provide stable and reliable standalone operation using default values or other method for values normally read over network.

Electric Power: Ability to disconnect any controller safely from its power source.

Wiring Labels: Match control drawings.

Network Communication: Ability to locate a controller's location on network and communication architecture matches Shop Drawings.

Nameplates and Tags: Accurate and permanently attached to control panel doors, instrument, actuators and devices.

For Each Operator Workstation:

I/O points lists agree with naming conventions.

Graphics are complete.

UPS unit, if applicable, operates.

Communications and Interoperability: Demonstrate proper interoperability of data sharing, alarm and event management, trending, scheduling, and device and network management. Requirements must be met even if only one manufacturer's equipment is installed.

Data Presentation: On each operator workstation, demonstrate graphic display capabilities.

Reading of Any Property: Demonstrate ability to read and display any used readable object property of any device on network.

Set Point and Parameter Modifications: Show ability to modify set points and tuning parameters indicated.

Peer-to-Peer Data Exchange: Network devices are installed and configured to perform without need for operator intervention to implement Project sequence of operation and to share global data.

Alarm and Event Management: Alarms and events are installed and prioritized according to the Owner. Demonstrate that time delays and other logic are set up to avoid nuisance tripping. Show that operators with sufficient privileges are permitted.

Schedule Lists: Schedules are configured for start and stop, mode change, occupant overrides, and night setback as defined in sequence of operations.

Schedule Display and Modification: Ability to display any schedule with start and stop times for calendar year. Show that all calendar entries and schedules are modifiable from any connected operator workstation by an operator with sufficient privilege.

Archival Storage of Data: Data archiving is handled by operator workstation and server and local trend archiving and display is accomplished.

Modification of Trend Log Object Parameters: Operator with sufficient privilege can change logged data points, sampling rate, and trend duration.

Device and Network Management:

Display of network device status.

Display of BACnet Object Information.

Silencing devices transmitting erroneous data.

Time synchronization.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Remote device re-initialization.
Backup and restore network device programming and master database(s).
Configuration management of routers.

ADJUSTING

Occupancy Adjustments: When requested within 18 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

MAINTENANCE SERVICE

Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 18 months' full maintenance by DDC system manufacturer's authorized service representative. Include quarterly preventive maintenance, repair or replacement of worn or defective components, cleaning, calibration and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

SOFTWARE SERVICE AGREEMENT

Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two year.

Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

Upgrade Notice: At least 30 days to allow the Owner to schedule and access system and to upgrade computer equipment if necessary.

DEMONSTRATION

Engage a factory-authorized service representative with complete knowledge of Project-specific system installed to train Owner's maintenance personnel to adjust, operate, and maintain DDC system.

Extent of Training:

Base extent of training on scope and complexity of DDC system indicated and training requirements indicated. Provide extent of training required to satisfy requirements indicated even if more than minimum training requirements are indicated.

Inform the Owner of anticipated training requirements if more than minimum training requirements are indicated.

Minimum Training Requirements:

Provide not less than five days of training total.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Stagger training over multiple training classes to accommodate Owner's requirements.
All training shall occur before end of warranty period.
Total days of training shall be broken into not more than two separate training classes.
Each training class shall be not less than two consecutive days.

Training Schedule:

Schedule training with the Owner 20 business days before expected Substantial Completion.
Schedule training to provide the Owner with at least 10 business days of notice in advance of training.
Training shall occur within normal business hours at a mutually agreed on time. Unless otherwise agreed to, training shall occur Monday through Friday, except on U.S. Federal holidays, with two morning sessions and two afternoon sessions. Each morning session and afternoon session shall be split in half with 30-minute break between sessions. Morning and afternoon sessions shall be separated by 60-minute lunch period. Training, including breaks and excluding lunch period, shall not exceed eight hours per day.
Provide staggered training schedule as requested by the Owner.

Training Attendee List and Sign-in Sheet:

Request from the Owner in advance of training a proposed attendee list with name, phone number and e-mail address.
Provide a preprinted sign-in sheet for each training session with proposed attendees listed and no fewer than six blank spaces to add additional attendees.
Preprinted sign-in sheet shall include training session number, date and time, instructor name, phone number and e-mail address, and brief description of content to be covered during session. List attendees with columns for name, phone number, e-mail address and a column for attendee signature or initials.
Circulate sign-in sheet at beginning of each session and solicit attendees to sign or initial in applicable location.
At end of each training day, send the Owner an e-mail with an attachment of scanned copy (PDF) of circulated sign-in sheet for each session.

Attendee Training Manuals:

Provide each attendee with a color hard copy of all training materials and visual presentations.
Hard-copy materials shall be organized in a three-ring binder with table of contents and individual divider tabs marked for each logical grouping of subject matter. Organize material to provide space for attendees to take handwritten notes within training manuals.
In addition to hard-copy materials included in training manual, provide each binder with a sleeve or pocket that includes a DVD or flash drive with PDF copy of all hard-copy materials.

Organization of Training Sessions:

Organize training sessions into logical groupings of technical content and to reflect different levels of operators having access to system. Plan training sessions to accommodate the following three levels of operators:

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Daily operators.
Advanced operators.
System managers and administrators.

Plan and organize training sessions to group training content to protect DDC system security.
Some attendees may be restricted to some training sessions that cover restricted content for purposes of maintaining DDC system security.

Training Outline:

Submit training outline for the Owner review at least ten business day before scheduling training.
Outline shall include a detailed agenda for each training day that is broken down into each of four training sessions that day, training objectives for each training session and synopses for each lesson planned.

On-Site Training:

The Owner will provide conditioned classroom or workspace with ample desks or tables, chairs, power and data connectivity for instructor and each attendee.
Instructor shall provide training materials, projector and other audiovisual equipment used in training.
Provide as much of training located on-site as deemed feasible and practical by the Owner.
On-site training shall include regular walk-through tours, as required, to observe each unique product type installed with hands-on review of operation, calibration and service requirements.
Operator workstation provided with DDC system shall be used in training. If operator workstation is not indicated, provide a temporary workstation to convey training content.

Training Content for Daily Operators:

Basic operation of system.
Understanding DDC system architecture and configuration.
Understanding each unique product type installed including performance and service requirements for each.
Understanding operation of each system and equipment controlled by DDC system including sequences of operation, each unique control algorithm and each unique optimization routine.
Operating operator workstations, printers and other peripherals.
Logging on and off system.
Accessing graphics, reports and alarms.
Adjusting and changing set points and time schedules.
Recognizing DDC system malfunctions.
Understanding content of operation and maintenance manuals including control drawings.
Understanding physical location and placement of DDC controllers and I/O hardware.
Accessing data from DDC controllers.
Operating portable operator workstations.
Review of DDC testing results to establish basic understanding of DDC system operating performance and HVAC system limitations as of Substantial Completion.
Running each specified report and log.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- Displaying and demonstrating each data entry to show Project-specific customizing capability.
- Demonstrating parameter changes.
- Stepping through graphics penetration tree, displaying all graphics, demonstrating dynamic updating, and direct access to graphics.
- Executing digital and analog commands in graphic mode.
- Demonstrating control loop precision and stability via trend logs of I/O for not less than 10 percent of I/O installed.
- Demonstrating DDC system performance through trend logs and command tracing.
- Demonstrating scan, update, and alarm responsiveness.
- Demonstrating spreadsheet and curve plot software, and its integration with database.
- Demonstrating on-line user guide, and help function and mail facility.
- Demonstrating multitasking by showing dynamic curve plot, and graphic construction operating simultaneously via split screen.
- Demonstrating the following for HVAC systems and equipment controlled by DDC system:

- Operation of HVAC equipment in normal-off, -on and failed conditions while observing individual equipment, dampers and valves for correct position under each condition.
- For HVAC equipment with factory-installed software, show that integration into DDC system is able to communicate with DDC controllers or gateways, as applicable.
- Using graphed trends, show that sequence of operation is executed in correct manner, and HVAC systems operate properly through complete sequence of operation including seasonal change, occupied and unoccupied modes, warm-up and cool-down cycles and other modes of operation indicated.
- Hardware interlocks and safeties function properly and DDC system performs correct sequence of operation after electrical power interruption and resumption after power is restored.
- Reporting of alarm conditions for each alarm, and confirm that alarms are received at assigned locations, including operator workstations.
- Each control loop responds to set point adjustment and stabilizes within time period indicated.
- Sharing of previously graphed trends of all control loops to demonstrate that each control loop is stable and set points are being maintained.

Training Content for Advanced Operators:

- Making and changing workstation graphics.
- Creating, deleting and modifying alarms including annunciation and routing.
- Creating, deleting and modifying point trend logs including graphing and printing on an ad-hoc basis and operator-defined time intervals.
- Creating, deleting and modifying reports.
- Creating, deleting and modifying points.
- Creating, deleting and modifying programming including ability to edit control programs off-line.
- Creating, deleting and modifying system graphics and other types of displays.
- Adding DDC controllers and other network communication devices such as gateways and routers.
- Adding operator workstations.
- Performing DDC system checkout and diagnostic procedures.
- Performing DDC controllers operation and maintenance procedures.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Performing operator workstation operation and maintenance procedures.
Configuring DDC system hardware including controllers, workstations, communication devices and I/O points.
Maintaining, calibrating, troubleshooting, diagnosing and repairing hardware.
Adjusting, calibrating and replacing DDC system components.

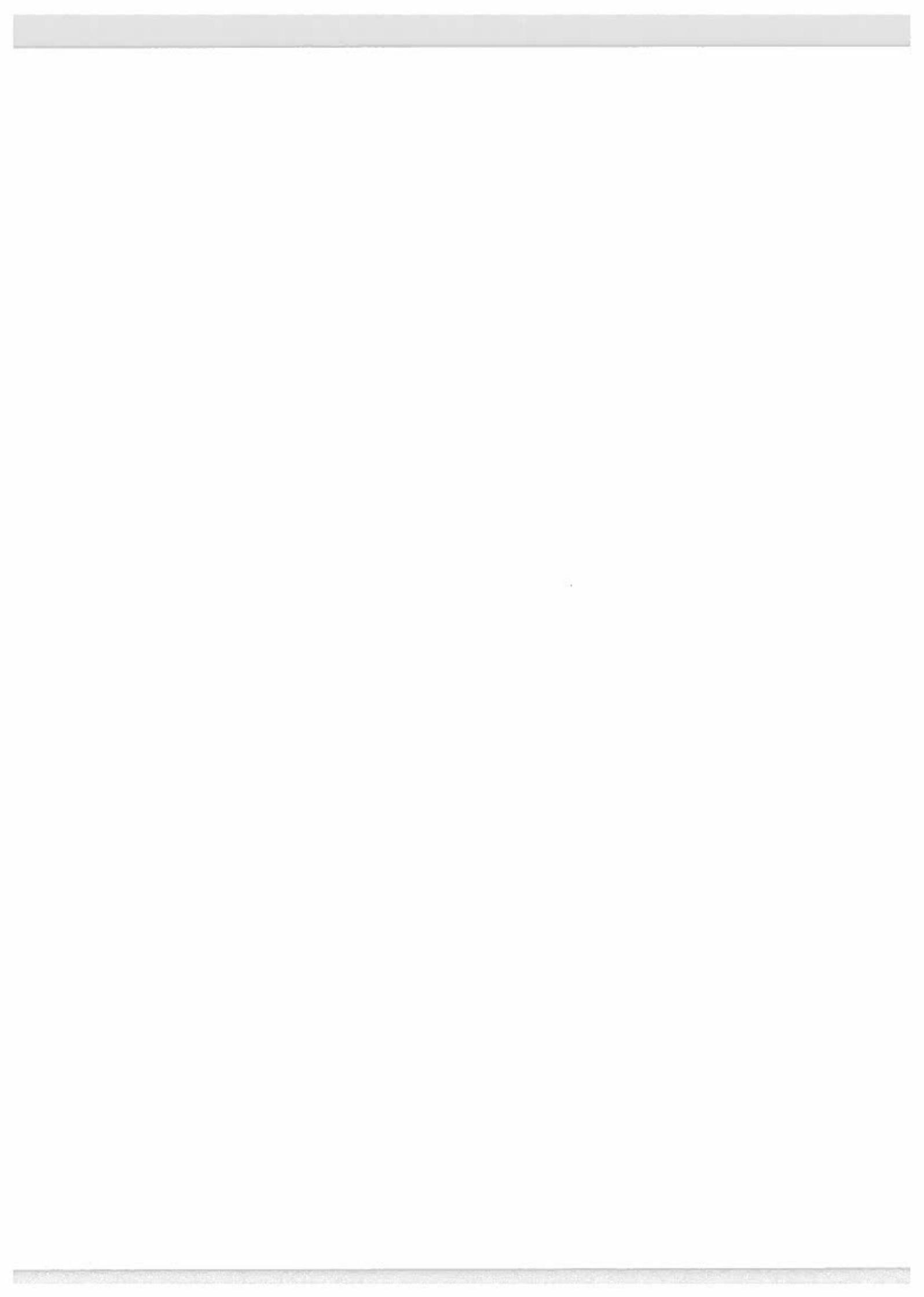
Training Content for System Managers and Administrators:

DDC system software maintenance and backups.
Uploading, downloading and off-line archiving of all DDC system software and databases.
Interface with Project-specific, third-party operator software.
Understanding password and security procedures.
Adding new operators and making modifications to existing operators.
Operator password assignments and modification.
Operator authority assignment and modification.
Workstation data segregation and modification.

Video of Training Sessions:

Provide a digital video and audio recording of each training session. Create a separate recording file for each session.
Stamp each recording file with training session number, session name and date.
Provide the Owner with two copies of digital files on DVDs or flash drives for later reference and for use in future training.
The Owner retains right to make additional copies for intended training purposes without having to pay royalties.

END OF SECTION 23 09 13



**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General Provisions of the Contract, including General and Supplementary Conditions and Division 1, General Requirements, apply to the work specified in this Section.
- B. The General Requirements in Section 20 00 50 shall also govern the work under this Section.

1.2 QUALIFICATIONS OF THE HVAC SYSTEM CLEANING CONTRACTOR

- A. **Membership:** The HVAC system cleaning contractor shall be a certified member of the National Air Duct Cleaners Association (NADCA), or shall maintain membership in a nationally recognized non-profit industry organization dedicated to the cleaning of HVAC systems.
- B. **Certification:** The HVAC system cleaning contractor shall have a minimum of one (1) Air System Cleaning Specialist (ASCS) certified by NADCA on a full time basis, or shall have staff certified by a nationally recognized certification program and organization dedicated to the cleaning of HVAC systems.
- C. **Supervisor Qualifications:** A person certified as an ASCS by NADCA, or maintaining an equivalent certification by a nationally recognized program and organization, shall be responsible for the total work herein specified.
- D. **Experience:** The HVAC system cleaning contractor shall submit records of experience in the field of HVAC system cleaning as requested by the **Owner**. Bids shall only be considered from firms which are regularly engaged in HVAC system maintenance with an emphasis on HVAC system cleaning and decontamination.
- E. **Equipment, Materials and Labor:** The HVAC system cleaning contractor shall possess and furnish all necessary equipment, materials and labor to adequately perform the specified services.
 - 1. The contractor shall assure that its employees have received safety equipment training, medical surveillance programs, individual health protection measures, and manufacturer's product and material safety data sheets (MSDS) as required for the work by the U.S. Occupational Safety and Health Administration, and as described by this specification. For work performed in countries outside of the U.S.A., contractors should comply with applicable national safety codes and standards.
 - 2. The contractor shall maintain a copy of all current MSDS documentation and safety certifications at the site at all times, as well as comply with all other site documentation requirements of applicable OSHA programs and this specification
 - 3. Contractor shall submit to the **Owner** all Material Safety Data Sheets (MSDS) for all chemical products proposed to be used in the cleaning process.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- F. Licensing: The HVAC system cleaning contractor shall provide proof of maintaining the proper license(s), if any, as required to do work in this state. Contractor shall comply with all Federal, state and local rules, regulations, and licensing requirements.

1.3 STANDARDS

- A. NADCA Standards: The HVAC system cleaning contractor shall perform the services specified here in accordance with the current published standards of the National Air Duct Cleaners Association (NADCA).

1. All terms in this specification shall have their meaning defined as stated in the NADCA Standards.
2. NADCA Standards must be followed with no modifications or deviations being allowed.

1.4 DOCUMENTS

- A. Mechanical Drawings: The **Owner** shall provide the HVAC system cleaning contractor with one copy of the following documents:

1. Project drawings and specifications.
2. Approved construction revisions pertaining to the HVAC system.
3. Any existing indoor air quality (IAQ) assessments or environmental reports prepared for the facility.

PART 2 – HVAC SYSTEM CLEANING SPECIFICATIONS AND REQUIREMENTS.

2.1 SCOPE OF WORK

- A. Scope: This section defines the *minimum* requirements necessary to render HVAC components clean, and to verify the cleanliness through inspection and/or testing in accordance with items specified herein and applicable NADCA Standards.

The Contractor shall be responsible for the removal of visible surface contaminants and deposits from within the HVAC system in strict accordance with these specifications.

The HVAC system includes any interior surface of the facility's air distribution system for conditioned spaces and/or occupied zones. This includes the entire heating, air-conditioning and ventilation system from the points where the air enters the system to the points where the air is discharged from the system. The return air grilles, return air ducts to the air handling unit (AHU), the interior surfaces of the AHU, mixing box, coil compartment, condensate drain pans, humidifiers and dehumidifiers, supply air ducts, fans, fan housing, fan blades, air wash systems, spray eliminators, turning vanes, filters, filter housings, reheat coils, and supply diffusers are all considered part of the HVAC system. The HVAC system may also include other components such as dedicated exhaust and ventilation components and make-up air systems.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

2.2 HVAC SYSTEM COMPONENT INSPECTIONS AND SITE PREPARATION

- A. **HVAC System Component Inspections:** Prior to the commencement of any cleaning work, the HVAC system cleaning contractor shall perform a visual inspection of the HVAC system to determine appropriate methods, tools, and equipment required to satisfactorily complete this project. The cleanliness inspection should include air handling units and representative areas of the HVAC system components and ductwork. In HVAC systems that include multiple air handling units, a representative sample of the units should be inspected.

The cleanliness inspection shall be conducted without negatively impacting the indoor environment through excessive disruption of settled dust, microbial amplification or other debris. In cases where contamination is suspected, and/or in sensitive environments where even small amounts of contaminant may be of concern, environmental engineering control measures should be implemented

1. Damaged system components found during the inspection shall be documented and brought to the attention of the **Owner**.

- B. **Site Evaluation and Preparations:** Contractor shall conduct a site evaluation, and establish a specific, coordinated plan which details how each area of the building will be protected during the various phases of the project.
- C. **Inspector Qualifications:** Qualified personnel should perform the HVAC cleanliness inspection to determine the need for cleaning. At minimum, such personnel should have an understanding of HVAC system design, and experience in utilizing accepted indoor environmental sampling practices, current industry HVAC cleaning procedures, and applicable industry standards.

2.3 GENERAL HVAC SYSTEM CLEANING REQUIREMENTS

- A. **Containment:** Debris removed during cleaning shall be collected and precautions must be taken to ensure that Debris is not otherwise dispersed outside the HVAC system during the cleaning process.
- B. **Particulate Collection:** Where the Particulate Collection Equipment is exhausting inside the building, HEPA filtration with 99.97% collection efficiency for 0.3-micron size (or greater) particles shall be used. When the Particulate Collection Equipment is exhausting outside the building, Mechanical Cleaning operations shall be undertaken only with Particulate Collection Equipment in place, including adequate filtration to contain Debris removed from the HVAC system. When the Particulate Collection Equipment is exhausting outside the building, precautions shall be taken to locate the equipment down wind and away from all air intakes and other points of entry into the building.
- C. **Controlling Odors:** Measures shall be employed to control odors and/or mist vapors during the cleaning process.
- D. **Component Cleaning:** Cleaning methods shall be employed such that all HVAC system components must be Visibly Clean as defined in applicable standards (see NADCA

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Standards). Upon completion, all components must be returned to those settings recorded just prior to cleaning operations.

- E. **Air-Volume Control Devices:** Dampers and any air-directional mechanical devices inside the HVAC system must have their position marked prior to cleaning and, upon completion, must be restored to their marked position.
- F. **Service Openings:** The contractor shall utilize service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry, and inspection.
 - 1. Contractor shall utilize the existing service openings already installed in the HVAC system where possible.
 - 2. Other openings shall be created where needed and they must be created so they can be sealed in accordance with industry codes and standards.
 - 3. Closures must not significantly hinder, restrict, or alter the airflow within the system.
 - 4. Closures must be properly insulated to prevent heat loss/gain or condensation on surfaces within the system.
 - 5. Openings must not compromise the structural integrity of the system.
 - 6. Construction techniques used in the creation of openings should conform to requirements of applicable building and fire codes, and applicable NFPA, SMACNA and NADCA Standards.
 - 7. Cutting service openings into flexible duct is not permitted. Flexible duct shall be disconnected at the ends as needed for proper cleaning and inspection.
 - 8. Rigid fiber glass duct systems shall be resealed in accordance with NAIMA recommended practices. Only closure techniques that comply with UL Standard 181 or UL Standard 181a are suitable for fiber glass duct system closures.
 - 9. All service openings capable of being re-opened for future inspection or remediation shall be clearly marked and shall have their location reported to the **Owner** in project report documents.
- G. **Ceiling sections (tile):** The contractor may remove and reinstall ceiling sections to gain access to HVAC systems during the cleaning process.
- H. **Air distribution devices (registers, grilles & diffusers):** The contractor shall clean all air distribution devices.
- I. **Air handling units, terminal units (VAV, Dual duct boxes, etc.), blowers and exhaust fans:** The contractor shall insure that supply, return, and exhaust fans and blowers are thoroughly cleaned. Areas to be cleaned include blowers, fan housings, plenums (except ceiling supply and return plenums), scrolls, blades, or vanes, shafts, baffles, dampers and drive assemblies. All visible surface contamination deposits shall be removed in accordance with NADCA Standards. Contractor shall:
 - 1. Clean all air handling units (AHU) internal surfaces, components and condensate collectors and drains.
 - 2. Assure that a suitable operative drainage system is in place prior to beginning wash down procedures.
 - 3. Clean all coils and related components, including evaporator fins.
- J. **Contractor shall:**

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1. Create service openings in the system as necessary in order to accommodate cleaning of otherwise inaccessible areas.
2. Mechanically clean all duct systems to remove all visible contaminants, such that the systems are capable of passing Cleaning Verification Tests (see NADCA Standards).

2.4 HEALTH AND SAFETY

- A. **Safety Standards:** Cleaning contractors shall comply with applicable federal, state, and local requirements for protecting the safety of the contractor's employees, building occupants, and the environment. In particular, all applicable standards of the Occupational Safety and Health Administration (OSHA) shall be followed when working in accordance with this specification.
- B. **Occupant Safety:** No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.
- C. **Disposal of Debris:** All Debris removed from the HVAC System shall be disposed of in accordance with applicable federal, state and local requirements.

2.5 MECHANICAL CLEANING METHODOLOGY

- A. **Source Removal Cleaning Methods:** The HVAC system shall be cleaned using Source Removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and safely remove contaminants from the facility. It is the contractor's responsibility to select Source Removal methods that will render the HVAC system Visibly Clean and capable of passing cleaning verification methods (See applicable NADCA Standards) and other specified tests, in accordance with all general requirements. No cleaning method, or combination of methods, shall be used which could potentially damage components of the HVAC system or negatively alter the integrity of the system.
 1. All methods used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment are assured.
 2. All vacuum devices exhausting air inside the building shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.
 3. All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain Debris removed from the HVAC system. Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standards, codes or regulations.
 4. All methods require mechanical agitation devices to dislodge debris adhered to interior HVAC system surfaces, such that debris may be safely conveyed to vacuum collection devices. Acceptable methods will include those, which will not potentially damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork or system components.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

B. Methods of Cleaning Fibrous Glass Insulated Components

1. Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAIMA standards and recommendations.
2. Cleaning methods used shall not cause damage to fibrous glass components and will render the system capable of passing Cleaning Verification Tests (see NADCA Standards).

C. Damaged Fibrous Glass Material

1. Evidence of damage: If there is any evidence of damage, deterioration, delaminating, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating, they shall be identified for replacement.
2. Replacement: When requested or specified, Contractor must be capable of remediating exposed damaged insulation in air handlers and/or ductwork requiring replacement.
3. Replacement material: In the event fiber glass materials must be replaced, all materials shall conform to applicable industry codes and standards, including those of UL and SMACNA. Replacement of damaged insulation is **not** covered by this specification.

D. Cleaning of coils

1. Any cleaning method may be used which will render the Coil Visibly Clean and capable of passing Coil Cleaning Verification (see applicable NADCA Standards). Coil drain pans shall be subject to Non-Porous Surfaces Cleaning Verification. The drain for the condensate drain pan shall be operational. Cleaning methods shall not cause any appreciable damage to, displacement of, inhibit heat transfer, or erosion of the coil surface or fins, and shall conform to coil manufacturer recommendations when available. Coils shall be thoroughly rinsed with clean water to remove any latent residues.

E. Antimicrobial Agents and Coatings

1. Antimicrobial agents shall only be applied if active fungal growth is reasonably suspected, or where unacceptable levels of fungal contamination have been verified through testing.
2. Application of any antimicrobial agents used to control the growth of fungal or bacteriological contaminants shall be performed after the removal of surface deposits and debris.
3. When used, antimicrobial treatments and coatings shall be applied in strict accordance with the manufacturer's written recommendations and EPA registration listing.
4. Antimicrobial coatings shall be applied according to the manufacturer's written instructions. Coatings shall be sprayed directly onto interior ductwork surfaces, rather than "fogged" downstream onto surfaces.

2.6 CLEANLINESS VERIFICATION

- A. General:** Verification of HVAC System cleanliness will be determined after mechanical cleaning and before the application of any treatment or introduction of any treatment-related substance to the HVAC system, including biocidal agents and coatings.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- B. Visual Inspection: The HVAC system shall be inspected visually to ensure that no visible contaminants are present.
1. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean; however, the **Owner** reserves the right to further verify system cleanliness through Surface Comparison Testing or the NADCA vacuum test specified in the NADCA standards.
 2. If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be re-cleaned and subjected to re-inspection for cleanliness.
 3. NADCA vacuum test analysis should be performed by a qualified third party experienced in testing of this nature.

C. Verification of Coil Cleaning

1. Cleaning must restore the coil pressure drop to within 10 percent of the pressure drop measured when the coil was first installed. If the original pressure drop is not known, the coil will be considered clean only if the coil is free of foreign matter and chemical residue, based on a thorough visual inspection (see NADCA Standards).

2.7 PRE-EXISTING SYSTEM DAMAGE

- A. Contractor is not responsible for problems resulting from prior inappropriate or careless cleaning techniques of others.

2.8 POST-PROJECT REPORT

- A. At the conclusion of the project, the Contractor shall provide a report to the **Owner** indicating the following:
1. Success of the cleaning project, as verified through visual inspection and/or gravimetric analysis.
 2. Areas of the system found to be damaged and/or in need of repair.

2.9 APPLICABLE STANDARDS AND PUBLICATIONS:

The following current standards and publications of the issues currently in effect form a part of this specification to the extent indicated by any reference thereto:

- A. National Air Duct Cleaners Association (NADCA): "Assessment, Cleaning & Restoration of HVAC Systems (ACR 2005)," 2004.
- B. National Air Duct Cleaners Association (NADCA): "Understanding Microbial Contamination in HVAC Systems," 1996.
- C. National Air Duct Cleaners Association (NADCA): "Introduction to HVAC System Cleaning Services," 2004.
- D. National Air Duct Cleaners Association (NADCA): Standard 05 "Requirements for the Installation of Service Openings in HVAC Systems," 2004.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- E. Underwriters' Laboratories (UL): UL Standard 181.
- F. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE): Standard 62-10, "Ventilation for Acceptable Indoor Air Quality".
- G. Environmental Protection Agency (EPA): "Building Air Quality," December 1991.
- H. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "HVAC Duct Construction Standards - Metal and Flexible," 1985.
- I. North American Insulation Manufacturers Association (NAIMA): "Cleaning Fibrous Glass Insulated Air Duct Systems," 1993.

END OF SECTION 23 13 14

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 232113- HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.
- B. The General Requirements in Section 200050 shall also govern the work under this Section.
- C. Examine all drawings and data and coordinate the work of this Section with all related and adjoining work.

1.2 SCOPE OF WORK:

- A. This Contract includes all labor, material, equipment, tests and appliances required to furnish and install all HVAC as shown on drawings, implied and herein specified.
- B. The present location of the building will be as shown on drawings. Visit the site and examine the Architectural and other Mechanical trades showing all details of construction before submitting proposal.
- C. Connect all equipment with piping, ductwork and controls and leave ready to operate. Check all Architectural Mechanical and Electrical drawings and coordinate all work accordingly.
- D. Provide seismic restraints, vibration isolators and flexible connections in accordance with Section 230548. Provide flexible connections at all locations where pipes cross building seismic or expansion joints. Coordinate with Architectural.
- E. Drawings are diagrammatic and indicate the general arrangement of piping and do not show all minor details and fittings. Such items shall be included, as well as reasonable modification, in the layout as directed to prevent conflict with other trades. Attention is brought to Section 200050, "Coordination Drawings".

1.3 SUBMITTALS:

- A. In accordance with Section 200050, the following items shall be submitted for review.

Pipe and fittings
- B. Recycled Content: Provide data showing recycled materials content of materials and fabricated items provided for this project, stated as a percentage of the materials included in these items or materials provided as part of the Work of this Section.

1.4 ACCESS DOORS AND PANELS:

- A. Furnish and set access doors and frame for all valves and controls which are concealed in furred spaces. All access doors shall be furnished in Milcor, of flush type with frame and all doors shall be hinged with flush catches. Provide non-ferrous in all wet areas. Access doors shall be fire rated consistent with wall or ceiling in which they are installed.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- B. Where access is required to valves, etc., that occur above lay-in ceilings, these access doors can be omitted, provided suitable plastic markers identifying exact location of valves etc., on lay-in ceilings are applied directly below valve grouping and identified by a number, this number to be used as a marking on valve chart. Markers shall be applied to the ceiling grid, not the ceiling tile.

PART 2 -PRODUCTS

2.1 PIPE AND FITTINGS:

A. Copper Tubing:

- 1. Type "L", ASTM Specifications B88, shall be used for water lines.
- 2. Fittings shall be wrought copper or cast brass solder- joint pressure rated type.
- 3. Type "K" shall be used for underground piping with flared fittings.

B. Steel Piping:

- 1. Pipe shall be Standard Wall (Sch. 40) black carbon steel, ASTM A-120, Grade B, with threaded ends for sizes 1/2" through 2", for hot water heating piping.
- 2. All steam condensate return piping shall be run in (SCH 80) black steel.
- 3. Fittings shall be standard weight (125 lbs.), cast iron screwed, ASTM A126, Class A, for sizes 1/2" through 2". Piping 2" and under shall be screwed.
- 4. Victaulic Grade E couplings, fittings and accessories in conjunction with grooved end schedule 40 piping will be permitted in existing and new construction for hot water heating system.

2.2 PIPE AND FITTINGS:

- A. All fittings on welded lines shall be furnished in accordance with ASTM A105 Specification designed for welding. Branch outlets on mains 2-1/2" and smaller to be made with Weldolets or Thredolets. Welding fittings on mains and branches 3" and larger are to be full size of reducing tube designed for welding. All flanged valves 3" and larger and special equipment connections to be installed with weld neck flanges for welded construction.
- B. All nipples shall be extra strong as follows: Pipe size 1/2" to 4" - 6" close. Pipe size 5" - 12" - 12" close and of the same material as the piping they are used with.
- C. All copper tubing shall be furnished in Type "L" using sweat fittings unless otherwise noted. Copper tubing shall be furnished in Chase, Anaconda, Bridgeport or Revere.
- D. All black steel over 4" or other welded pipe shall have long radius welding ells and tees of the same wall thickness as the pipe. Welding tees will not be required where the mains and branches comply with the following schedule:

<u>Min. Size of Mains</u>	<u>Max. Size of Branch</u>
2 1/2"	3/4"
3"	1 1/4"

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

4"	2"
5"	3"

- E. Welding flanges shall be slip-on or welding neck type, 300 psig forged steel conforming to ANSI Specification B-16.5.
- F. All necessary precautions shall be taken when welding in the new building to prevent combustion of structure.

2.3 GROOVE PIPING:

- A. Victaulic couplings may be used in lieu of welding, thread or flanging on 2 1/2" through 30" carbon steel pipe, on heating water services from -30 deg. F. to 230 deg. F. within the manufacturer's rated working pressures. Pipe grooving shall be cut grooved and/or rolled grooved as per manufacturer's latest spec. Installation is per manufacturer's latest recommendations. All piping shall be Schedule 40. grooved piping shall be used only in concealed or service areas. Grooved piping will not be accepted in finished areas with no ceiling.
- B. Piping Components

Grooved couplings consisting of two or more pieces of ductile or malleable iron. Coupling gaskets will be a synthetic rubber gasket with a central cavity pressure responsive design. Coupling bolts and nuts shall be heat treated carbon steel, track head conforming to physical properties of ASTM-A-183. All grooved couplings shall be as manufactured by Victaulic Co. Style 77, 07 or equal.
- C. For piping 2 1/2" and larger, full size branch connections shall be made with manufactured grooved end tees. Branch connections for less than full size shall be made with Victaulic hole cut products. Style 920 or Style 921 branch connections with locating collar engaging into hole or style 72 outlet coupling used to join grooved pipe and to create a branch connection. Gaskets for branch connection shall be Victaulic Grade "E" EPDM Compound with working temperature of -30 deg. F. to 230 deg. F.
- D. Flanges
Vic-Flange Style 741 (2-24") for connection to ANSI class 125 and 150 flanged components.
- E. Fittings
Fittings shall be full flow cast fittings, steel fittings or segmentally welded fittings with grooves or shoulders designed to accept Victaulic grooved end couplings.
 1. Standard Fittings - shall be cast of ductile iron conforming to ASTM A-536 (Grade 65-45-12) or malleable iron conforming to ASTM A-47, Grade 32510, painted with a rust inhibiting modified vinyl Alkyd enamel or hot-dip galvanized to ASTM A-153 or zinc electroplated to ASTM B-633, as required.
 2. Standard Steel Elbow Fittings - (14" - 24"), shall be forged steel conforming to ASTM A-106 Grade B (0.375" wall), painted with rust inhibiting modified vinyl Alkyd enamel or hot-dip galvanized to ASTM A-153.
 3. Standard Segmentally Welded Fittings - shall be factory fabricated, by fitting manufacturer, of carbon steel pipe as follows, 3/4" - 4" conforming to ASTM A-53, Type F; 5" - 6" Sch. 40 conforming to ASTM A-53, Type E or S, Grade B; 8" - 12" Sch. 30 conforming to ASTM A-53, Type E or S, Grade B; 14" - 24" 0.375" wall conforming to ASTM A-53, Type E or S, Grade B, painted with rust inhibiting modified vinyl Alkyd enamel or hot-dip galvanized to

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

ASTM A-153, as required.

F. Victaulic Pipe Hanging (Victaulic Hanging Standard A-130)

1. Style 07 Zero-Flex for rigid piping systems should be supported as per Building Services B31.9 Hanging.
2. Style 77 flexible piping systems are supported as per Victaulic Hanging Standard A-130.

2.4 PIPING JOINTS:

A. Welded Joints shall be fusion welded in accordance with American Standard B31.1, Section 6, except as modified hereinafter. Changes in direction of piping shall be made with welding fittings only. Mitering, notching or direct welding of pipe to the main in order to form tees or ells will not be permitted. Branch connections may be made with welding tees or forced branch outlet fittings, as manufactured by Bonney Forge, either being acceptable without size limitation. Bonney Thredolets shall be used in lieu of Hald couplings when reducing from a welded run to a screwed branch. Outlet fittings where used shall be forged, flared for improved flow where attached to the run, reinforced against external strains and designed to maintain full pipe bursting strength. Fillet welds shall be used for welding screwed and slip-on steel flanges to pipes. Where lateral connections are to be used, either lateral fittings or Bonney Latrolets are acceptable. Wedded joints shall be used in finished areas with no ceiling.

B. Screwed Joints: The ends of pipes to be threaded shall be cut square and reamed. Pipe threads shall be standard taper, shall be cut straight and clean and to full depth, and shall be free from dirt, chips and burrs when the joint is made. Pipe joint lubricant or compound shall be selected for the pipe line service and shall be applied to male threads only. Screwed joints shall not be caulked.

C. Flanged Joints: This heading covers flanged joints of all types, including those made with flange unions. Flanged joints shall be made with suitable reinforced gaskets. Clean all parts and align the joint before assembling; support pipes or heavy parts independently. Opposite bolts shall be pulled up successively. Screwed steel flanges shall be welded to pipes; slip-on steel flanges shall be welded front and back.

Cast iron flanges shall not be welded to pipes. If raised face flanges are to be bolted against plain face flanges, the raised face shall be removed and a full face gasket used. Where flanged base elbows are installed, the base shall not be used for anchoring the line or otherwise subjected to tension or shear.

D. Soldered Joints in Copper Tubing: Cut the ends of tubes square, remove burrs, clean tube ends and fitting sockets with emery cloth and remove all particles before applying flux and making the joint. Insert tubes to full socket depth. Use the following solders at the given conditions.

- | | | |
|--------|---|---|
| 95 | - | 5% Tin-Antimony/all services/high pressure 250 degrees F. Max. |
| Silver | - | 35 to 45% alloy-refrigerant piping/high pressure and temperature. |

2.5 PIPE HANGERS:

- A. Securely hang and anchor pipe as shown and required with proper provision for expansion, contraction and elimination of undue stress and strain on piping.
- B. Provide a pipe hanger within two (2) feet of each elbow, tee, wye, valve, strainer and similar device.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- C. Secure and support runs at base and at sufficiently close intervals to hold pipe at alignment and to carry safely the weight of piping and contents without undue stress thereon.
- D. Except as indicated to the contrary, secure and support all horizontal piping as follows and required to prevent sagging, undue pipe movement and preserve proper alignment in each run.

<u>Piping</u>	<u>Sizes</u>	<u>Maximum Interval</u>
Cast Iron	All sizes	At each hub or joint
Steel	2" & smaller	Six (6) feet
Steel	2 1/2" & larger	Ten (10) feet
Copper Tubing	1 1/4" & smaller	Five (5) feet
Copper Tubing	1 1/2" & larger	Eight (8) feet

- E. Hangers up to and including 2" shall be the adjustable band type equal to Empire. Figure 310 for iron pipe and Fig. 310CT for copper tubing.
- F. Hangers for piping 2-1/2" and up shall be the clevis type, equal to Empire. Figure 11 for iron pipe and Figure 110CT for copper tubing.
- G. Hangers shall be suspended from one of the following devices:
 - 1. "C" clamps.
 - 2. Trapeze hanger assemblies consisting of back-to-back horizontal steel channels with end-type rod hangers.
 - 3. Expansion shield embedded into concrete or masonry.
- H. On hot water systems, provide over-sized hangers.

2.6 VALVES:

- A. This Contractor shall furnish and install valves where shown on plans and also wherever necessary to make the system complete in its operation. All valves shall be as manufactured by Stockham, Jamesbury, Centerline, Appollo, Milwaukee and Victaulic.

Hot Water Heating Water:

2" and smaller

Ball valves	Apollo 71-100/200
Check valves	Stockham B-310-T
Vertical check valves	Stockham B-310-T

2-1/2" and larger

Butterfly valves	Stockham - LG712-BS3-B (Lug Style)
Check valves	Centerline - Series 800 S.S. plate and spring, and nypalon seats.

Furnish all valve materials suitable for service intended. No gate valves shall be allowed. Provide all valves with factory installed extension stems.

2.7 UNIONS:

- A. All unions shall be furnished in Nibco-633 or equal in Chase, Revere, Jefferson and Anaconda.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

2.8 GASKETS:

- A. Where flanges occur, they shall be packed with Klinger or approved equivalent high quality non-asbestos material composed of fibers for industrial maintenance service with high chemical stability and heat resistance. Nitrile rubber bonded.

Temperature	750 deg. F. max.
Pressure	1450 psi max.
Compressibility	ASTM F36A
Tensile Strength	ASTM F152

2.9 FLOOR AND CEILING PLATES:

- A. Furnish and install satin chrome plated pressed metal floor and ceiling plates on all exposed pipes passing through floors, walls, ceilings, and partitions throughout.

2.10 REAMING OF PIPES:

- A. All pipes to be carefully reamed after cutting and threading.

2.11 PIPE ANCHORS:

- A. Furnish and install all steel clamps around mains not less than 1/4" thick and welded to pipe and necessary angle braces to substantial construction to meet job conditions. Anchored mains shall be properly guided.
- B. Vertical risers, if any, shall be anchored by similar clamps secured to floor, concealed in wall construction.

2.12 EXPANSION LOOPS AND JOINTS:

- A. Furnish and install all expansion joints with mains and loops properly anchored and guided to allow for the necessary expansion of mains and all run outs shall be piped to allow for necessary expansion on risers and mains. In cases where space is limited, expansion joints with compensators, guides and anchors may be used in place of expansion loops as approved by the Engineer.
- B. Provide all expansion joints in Keflex or equal in Fulton Syphon, Flexonics or Adscos, with compensator guides and anchors. Piping joints 3" and larger shall be free-flexing type with Type 304 stainless steel bellows and 150-lb. van stone flanges. Lines of 2-1/2" and smaller shall be equipped with Quadra Side H compensators having multi-ply stainless steel bellows, carbon steel thread and shroud, each for 1" compression and 3" extension.
- C. Pipe alignment guides shall be installed in accordance with manufacturer's published bulletin. Anchors shall have sufficient strength to prevent movement of the piping beyond anchor points.

2.13 HANGERS AND SLEEVES:

- A. All horizontal piping shall be supported in a good, firm and substantial manner. No chains, horizontal pieces of pipe or hangers formed by means of perforated steel bands, pipe rings and hooks will be permitted. Provide cast iron ceiling plates for all hangers in finished basement

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

ceilings. All hangers shall be oversized

- B. Furnish and place "Hole-Outs" plastic preformed knockout sleeves for all pipes passing through concrete or tile floors or partitions. All pipes passing through toilet room and mechanical room floors shall be provided with grouted, split Schedule 80 steel pipe sleeves, packed with hair felt and Portland cement to allow for flushing of floors without leakage. All pipes and conduits passing through floors, walls or partitions shall be provided with sleeves sized to give a minimum of 1/2" clearance between sleeve and the outside diameter of the pipe, conduit or insulation, enclosing the pipe or conduit.
- C. Sleeves through concrete floors or interior masonry walls shall be Schedule 40 steel pipe, set flush with finished wall or ceiling surfaces, but extending 2 inches above finished floors or shall be in accordance with details on drawings. In all mechanical equipment rooms or penthouses, sleeves shall extend 6 inches above finished floor.
- D. All outside piping passing through exterior walls, foundation walls and floors shall be furnished with flanged C.I. wall sleeves in Zurn, J.R. Smith or Josam. Furnish with flashing clamp where sleeve passes through waterproof membrane.

2.14 SPECIALTIES FOR HOT WATER SYSTEM:

- A. Furnish and install the following accessories and equipment in make other than Bell & Gossett.
 - 1. Thermometers: Install Ashcroft Fig. 7173T BI-Metal "Every Angle" thermometers where shown and/or called for on plans or in specifications.
 - 2. Thermometers shall have 5" aluminum hermeticism sealed case with stainless steel stem with 1/2" NPT connection. Install in separable well in brass with lagging extension neck. Stem length and dial range shall be 6" and 0 degrees to 250 degrees F., respectively.
 - 3. Furnish and install on non-critical systems, gauges suitable for use on hot water where indicated on drawings or called for in specifications. Gauge shall be Ashcroft Fig. 2070 with silver brazed boudon tube, aluminum back flange type epoxy coated case, chrome ring, 1/4" NPT lower connection, stainless steel movement with 1% accuracy. Pressure range shall be as required. Furnish 1/4" needlepoint valve in Crane #88 for each gauge. Where sharp pressure fluctuations may occur, mount gauge on a 1/4" Fig. 1106B pulsation dampener. Provide compound gauges where required or called for.
 - 4. Furnish and install gauges on all pump discharge and compound gauges on all pump suction.
 - 5. Furnish and install balancing valves on supply and return mains and branch mains from 1-1/2" and larger.
 - 6. Expansion fittings shall be provided in Flexonics Type H expansion joints, sized as required to take up all expansion in mains and/or branches or equal in Anaconda.
 - 7. Furnish and install all balancing valves on air handling unit coil, etc., runouts 2" and smaller in Tour Andersson STA-D Series with ""A metal"" construction. Branch mains 2 1/2" and larger shall be provided with Tour Andersson STA-F Series balancing valve.
 - 8. Furnish and install dielectric fittings.
 - 9. Furnish and install brass cap with chain on all strainers, drains and hose connections.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

2.15 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
Description:

Standard: ASSE 1079.
Pressure Rating: 150 psig minimum at 180 deg F
End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:
Description:

Standard: ASSE 1079.
Factory-fabricated, bolted, companion-flange assembly.
Pressure Rating: 150 psig minimum at 180 deg F
End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- D. Dielectric-Flange Insulating Kits:
Description:

Nonconducting materials for field assembly of companion flanges.
Pressure Rating: 150 psig.
Gasket: Neoprene or phenolic.
Bolt Sleeves: Phenolic or polyethylene.
Washers: Phenolic with steel backing washers.
- E. Dielectric Nipples:
Description:

Standard: IAPMO PS 66.
Electroplated steel nipple, complying with ASTM F 1545.
Pressure Rating: 300 psig at 225 deg F.
End Connections: Male threaded or grooved.
Lining: Inert and noncorrosive, propylene.

2.16 REFRIGERANT PIPING:

- A. All refrigerant piping shall be installed in compliance with all state and local code requirements.
- B. Contractor shall field verify piping length and layout with the equipment manufacturer prior to start of any work. Contractor shall submit a shop drawing showing refrigeration pipe layout, lengths and pipe sizes prior to start of installing any refrigeration piping.
- C. Refrigerant piping shall be copper tube ASTM B 280, Type ACR, hard-drawn straight lengths or soft-annealed coil, seamless copper tubing. Tubing shall be factory cleaned, ready for use and installation, and have ends capped to protect cleanliness of pipe interior.
- D. Fittings shall be Wrought-Copper fittings ANSI B16.22, streamline pattern.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- E. Tubing shall be joined using brazing filler material such as phosphor or silver alloy. Comply with the procedures contained in the AWS "Brazing Manual". Contractor shall take all appropriate precautions when conducting brazing work to protect the building and people from fumes, fire and smoke. Fill pipe with inert gas such as dry nitrogen to prevent formation of scale while brazing.
- F. Contractor shall coordinate and provide all refrigeration piping specialties as required by the refrigeration equipment manufacturer to ensure a complete and functioning refrigeration system. Refrigeration specialties shall be UL approved, listed and shall conform to ASI 760.
- G. Install refrigerant piping in accordance with ASHRAE standard 15. Install piping in as short and direct manner as possible to minimize pressure drop and refrigerant volume. Install using the fewest number of joints and fittings as possible.
- H. Arrange piping to allow for inspection, leak testing, and servicing of the fittings and adjacent equipment. Allow for adequate service clearances of piping and equipment.
- I. Provide insulation for refrigeration piping and condensate drain piping as recommended by the equipment manufacturer. If the manufacturer does not have any insulating requirements or recommendations then the contractor shall at minimum insulate the suction line from the evaporator to the condensing unit (compressor inlet) and the condensate drain line.

Do not install insulation until all refrigerant piping has been tested and proven to be free from leaks. Insulation shall be UV resistant and shall comply with NFPA requirements for fire and smoke developed rating for foam and insulating materials.

- J. All penetrations shall be sleeved and shall be sealed. Provide weather tight seal for exterior pipe penetrations and firestopping for interior penetrations. Materials shall be of an approved type for the application.
- K. If necessary to remove refrigerant from the system the contractor is expected to adhere to all regulations and procedures governing reclaiming of the refrigerant. Under no circumstances may refrigerant be purged or released to the atmosphere.
- L. The contractor shall test all refrigerant piping and completely evacuate the refrigerant system using a vacuum pump. Contractor shall create a vacuum within the system corresponding to a temperature of 35 deg F on a vacuum dehydration indicator. Contractor shall valve off pump and inspect that system vacuum is maintained for a minimum of five (5) hours. Contractor shall then break vacuum using the approved refrigerant for the equipment connected to the piping system. Allow pressure to build gradually to a minimum holding charge pressure of 5 psi.
- M. Contractor shall measure and fill the refrigerant system with the type and quantity of refrigerant specified by the refrigeration equipment manufacturer. Contractor shall also take pipe volume and other additional line volume into account when charging the system. Contractor shall verify that sufficient operating charge is provided and leave system in full operating order.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

PART 3 -EXECUTION

3.1 INSTALLATION:

- A. Furnish and install the hot water piping as shown on plans. Furnish and install all control valves, flow valves, air vents, gate valves and/or balancing valves and drain valves.
- B. Provide hot water shutoff valves and combination shutoff and balancing cock for all equipment, hose cocks and drain valves at all low points. Provide air vents on all air handling equipment where they are required for proper operation of the system.
- C. Provide balancing cocks on all main branches for balancing flow to and from the various zones. Provide on all low points of mains or branches, brass hose cocks with hose connection for draining the system.
- D. Check all architectural, plumbing and electrical drawings to make sure that this piping will not conflict with such work.
- E. All piping work shall be installed with proper provision to allow for expansion and contraction of lines so as to prevent any undue strains on pipe and fittings, any trapping of lines or lifting or dislocating of any appliances. Rectify without cost to the Owner any conditions of noisy circulation due to trapped or air bound lines, including the expense of cutting and repairing of the building structure incident to making such alterations.
- F. Install the work to conform to space conditions and the work of other trades. The drawings indicate generally the runs and sizes of piping and, although the size must not be decreased, nor the drawings deviated from, except as unforeseen space conditions may require, the right is reversed to make minor changes in the arrangement of the work to meet conditions arising during construction.
- G. Check all architectural drawings to determine seismic and expansion joint location. Provide expansion fittings at all locations where pipes cross expansion or seismic joints. Coordinate with Architectural drawings for locations.

3.2 TESTING:

- A. All flow piping shall be tested and made tight.
- B. All piping, including hot water piping, shall be tested and made tight at 100 psi or 50 psi above the city pressure before any piping is concealed or approved.
- C. After the system is thoroughly cleaned, it shall be put into operation by this Contractor. All parts of the system shall be thoroughly tested and this Contractor shall carefully instruct the Owner's authorized representative as to the proper operation and are of the entire system.
- D. All low pressure piping shall be tested and made tight at 100 lbs. per square inch hydrostatic pressure before any piping is concealed or covered.
- E. Contractor shall purge all returns for a minimum period of two weeks after all supply lines, return lines and heating surfaces have been connected up and in operation or until all traces of grease, oil and dirt disappear.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- F. After the systems are thoroughly cleaned, they shall be put into operation by the Heating Contractor after all traps and strainers have been removed and cleaned. All parts of the system shall be thoroughly tested and this Contractor shall carefully instruct the Owner's authorized representatives as to the proper operation and care of the entire system.

3.3 FLUSHING OUT SYSTEM:

- A. Contractor shall purge and flush out the heating water systems before balancing up the systems. Provide spool pieces in place of control valves upon initial flushing. Initial flush with clean water for 24 hours then clean strainers, flush a second time, inspect, and clean strainers again. Repeat clean water flushing until strainers contain no visible evidence of sediment. Add cleaning agents thereafter.

3.4 BALANCING AND VENTING OF HOT WATER SYSTEM:

- A. Contractor shall provide all labor and materials as required to assist the Balancing Contractor in proper balancing of the water systems. Contractor shall return to the job and shall make necessary adjustments and corrections to the systems as required by the Balancing Contractor in order to achieve satisfactory system performance in accordance with design parameters.
- B. Contractor shall carefully vent the system when filling same and return to the job during the eighteen months guarantee period as required, to assure the Town of a proper operating system.
- C. System shall be slowly filled with cold water to purge air and shall maintain 4 psig on a gauge located conveniently near the top of the system.

END OF SECTION 23 21 13



**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.
- B. The General Requirements in Section 200050 shall also govern the work under this Section.
- C. Examine all drawings and data and coordinate the work of this Section with all related and adjoining work.

1.2 SCOPE OF WORK:

- A. Contract includes all labor, material, equipment accessories and test required to furnish and install all air distribution systems as shown on drawings, implied and herein specified, complete and ready to operate.
- B. Contractor is requested to examine all of the Architectural plans and all details of construction and visit the site of the proposed addition and alterations so as to thoroughly acquaint himself with all conditions before submitting his bid.
- C. Work shall include but is not limited to the following:
 - 1. Ductwork
 - 2. VAV Box
 - 3. Air Handling Units
 - 4. Return Air Fan
- D. Contractor shall be responsible for wiring of all temperature controls.

1.3 SUBMITTALS:

- A. Refer to Section 200050
- B. Submit the following shop drawings.
 - Ductwork
 - Fans
 - VAV Boxes
 - Air Handling Unit
 - Access Doors

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1.4 AIR DISTRIBUTION SYSTEM DESCRIPTION:

- A. Furnish and install all supply, return and exhaust air system as indicated on the drawings. Systems to be complete with fans, motors, controls, starters, unless otherwise specifically omitted, ducts, filter banks, registers, grilles, diffusers, vibration eliminating bases, balancing dampers, fire dampers, automatic dampers, acoustical lining, insulation and other accessories to make the system complete and ready to operate to the full intent of the plans and specifications. The capacities and characteristics of fans, air handling equipment, shall be as indicated on the drawings.
- B. All ductwork shall be run on warm side of building insulation.
- C. Design is based on equipment as described in the drawing equipment schedules. Any changes in foundations, connections, piping, controls, electrical equipment, wiring and connections and openings required by alternate equipment submitted and approved shall be made at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 DUCTWORK:

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- E. All sheet metal used throughout, except as specifically noted, shall be constructed of galvanized steel sheets as follows:

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Rectangular Ducts	Alum.	Copper	
Duct up to 12"	26 ga.	24 ga.	16 oz.
Duct 13" to 30"	24 ga.	22 ga.	24 oz.
Duct 31" to 60"	22 ga.	20 ga.	32 oz.
Duct 60" and beyond	20 ga.		
Casings up to 72"	16 ga.		
Casings beyond 72"	14 ga.		

Bracings for Ducts

Up to 24"	None
25" to 40"	1" x 1" x 1/8" 4 ft. from joint
41" to 60"	1-1/2" x 1-1/2" x 1/8" 4 ft. from joint
61" to 90"	1-1/2" x 1-1/2" x 1/8" diagonal angles or 1-1/2" x 1-1/2" x 1/8" angles 2 ft. from joint

- F. All fittings, joints, seams and connections shall be made up in accordance with standard recommended practice as described in Air Duct Design, latest ASHRAE Guide and SMACNA Low Pressure Standards, using Class B construction with all seams sealed. Snap lock joints will not be permitted.
- G. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- H. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.

2.2 MEDIUM PRESSURE ROUND DUCT:

- A. All medium pressure and round ductwork shall be manufactured by the same firm to assure tight fit of all ductwork and components. Provide ductwork in United McGill or Semco.
- B. Submit the round duct test data covering leakage rate, bursting strength, collapsing strength, seam strength, and friction loss. Friction loss test data shall cover both the duct and the assembled coupling joints. This friction loss data used in the design of this system, include information on fittings used in system.
- C. Round and oval duct shall be manufactured of galvanized steel meeting ASTM A-525 and A-527-67 by the following methods and in the minimum gauges listed:

Diameter	Minimum Gauge	Method of Manufacture
3" thru 14"	24 Ga.	Longitudinal Seam
15" thru 26"	22 Ga.	Longitudinal Seam
27" thru 36"	20 Ga.	Longitudinal Seam
37" thru 50"	20 Ga.	Longitudinal Seam
51" thru 60"	18 Ga.	Longitudinal Seam
61" and Up	16 Ga.	Longitudinal Seam

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Longitudinal seam duct shall have a fusion-welded butt seam.

D. Fittings and couplings shall be of the following minimum gauges:

Diameter	Gauge
3" thru 36"	20 Gauge
38" thru 50"	18 Gauge
Over 50"	16 Gauge

1. All fittings are to have continuous welds along seams. All divided flow fittings are to be manufactured as separate fittings, not as tap collars welded into spiral duct sections.
2. All 90 degrees tees and 45 degrees laterals (wyes) up to and including 12" diameter tap size shall have a radiused entrance into the tap, produced by machine or press forming. The entrance shall be free of weld buildup, burrs, or irregularities.
3. Elbows in diameters 3" through 8" shall be two section stamped elbows. All other elbows shall be gored construction with all seams continuous/welded.
4. Where it is necessary to use 2-piece mitered elbows, they shall have turning vanes in accordance with the following schedule.

Diameter	Number of Vanes
3" thru 9"	2
10" thru 14"	3
15" thru 19"	4
20" thru 60"	5
Over 60"	12" Spacing

- E. Registers to be mounted directly to duct shall be provided with boots for mounting to round spiral duct.
- F. Galvanized areas that have been damaged by welding shall be coated with corrosion resistant aluminum paint.
- G. Pipe-to-pipe joints in diameters to 36" shall be by the use of sleeve couplings, reinforced by rolled beads. Use welded angles for 37" diameter and above.

2.3 FLEXIBLE AIR DUCT:

A. Flexible air ducts shall be used to connect supply ducts with air distribution outlets where shown. Flexible air ducts shall be all metal construction consisting of a bonded two ply laminate mechanically corrugated for strength and air tightness and shall be able to withstand 12" W.G. pressure.

Flexible air duct shall be of semi- rigid construction capable of being easily hand preformed without subsequent sagging or droop. Duct connections to equipment outlet collars shall be made in accordance with the duct manufacturer's recommendations. Insulated flexible duct shall be Clevaflex Type 12 as manufactured by Clevepak Corporation, New York, New York 10022, or approved equal in Metalaire.

B. Flexible duct shall meet the requirements or NFPA 90A.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- C. All flexible duct shall be preinsulated. The maximum length of flex duct shall not exceed 6'-0".

2.4 JOINT SEALING:

- A. Duct joints shall be assembled and sealed as follows:
- B. Approved sealer is applied to the male end of the couplings and fittings. After the joint is slipped together, sheet metal screws are placed 1/2" from the joint bead for mechanical strength. Sealer is applied to the outside of the joint extending 1" on each side of the joint bead and covering the screw heads. Plastic-backed tape is immediately applied over the wet sealer.
- C. The duct sealer must be specifically formulated for the job of sealing the field joints for high pressure systems. The sealer shall be compatible with plastic-backed duct tape so the two shall cure and bond together. Samples of sealer and tape and the specification data sheets shall be submitted to the engineer for approval.
- D. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- E. Two-Part Tape Sealing System:

Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.

Tape Width: 4 inches.

Sealant: Modified styrene acrylic.

Water resistant.

Mold and mildew resistant.

Maximum Static-Pressure Class: 10-inch wg, positive and negative.

Service: Indoor and outdoor.

Service Temperature: Minus 40 to plus 200 deg F.

Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.

For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- F. Water-Based Joint and Seam Sealant:

Application Method: Brush on.

Solids Content: Minimum 65 percent.

Shore A Hardness: Minimum 20.

Water resistant.

Mold and mildew resistant.

VOC: Maximum 75 g/L (less water).

Maximum Static-Pressure Class: 10-inch wg, positive and negative.

Service: Indoor or outdoor.

Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

G. Solvent-Based Joint and Seam Sealant:

Application Method: Brush on.

Base: Synthetic rubber resin.

Solvent: Toluene and heptane.

Solids Content: Minimum 60 percent.

Shore A Hardness: Minimum 60.

Water resistant.

Mold and mildew resistant.

For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

VOC: Maximum 395 g/L.

Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

Maximum Static-Pressure Class: 10-inch wg, positive or negative.

Service: Indoor or outdoor.

Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

H. Flanged Joint Sealant: Comply with ASTM C 920.

General: Single-component, acid-curing, silicone, elastomeric.

Type: S.

Grade: NS.

Class: 25.

Use: O.

For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

I. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

J. Round Duct Joint O-Ring Seals:

Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.

EPDM O-ring to seal in concave bead in coupling or fitting spigot.

Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 ACCESS DOORS IN DUCTWORK:

- A.** Furnish hinged and reinforced access doors with wire glass observation port in door in sheet metal work for observation or maintenance of all dampers, controls in sheet metal ducts and housings. This applies to fresh air ducts, exhaust ducts, etc. Furnish doors of tight fitting construction. All duct access doors shall be furnished in Ventlok or equal in Air balance, Advanced Air, Inc. or Louvers & Dampers, Inc.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- B. For access doors in architectural finishes refer to Section 200050.

2.6 FIRE DAMPERS:

- A. Furnish and install all fire dampers and smoke dampers in Ruskin, Inc. or equal in Air Balance Inc or Controlair, as required by all local and state codes. On all central air supply and exhaust systems, furnish approved fire dampers in accordance with NFPA Bulletin 90A, latest edition, where required by local and state codes.
- B. Fire dampers shall possess a 1-1/2 hour dynamic fire protection rating in accordance with UL-555, continuing inspection service and bear the UL label. Fire damper shall be Ruskin Model DIBD2 vertical or horizontal, Style B Curtain type, as noted on plans.
 - 1. The blades are to be interlocking design mounted in a frame having two folded guides that serve as stops. Blades shall be 24GA galvanized steel.
 - 2. The mounting shall be 1-1/2" x 1-1/2" x 18" retaining angles on both sides of partition as per UL test. Sleeves and frame shall be 20GA per UL test.

2.7 VOLUME DAMPERS:

- A. Volume dampers with locking quadrants shall be provided on all supply, exhaust and return ducts, on all branches and at all take-off's to registers and diffusers.
- B. Dampers shall be constructed of #20 gauge steel properly stiffened and to have locking quadrants outside covering of ducts. Opposed blade multi-lead dampers shall be used wherever damper blade is larger than 12".

2.8 SPLITTERS AND DUCTURNS:

- A. Furnish and install splitter dampers in ductwork made of #20 gauge steel for proper control of air, where ductwork branches off from main supply ducts.
- B. Refer to "Access Doors" for type of access doors required for access to ceiling dampers.
- C. Install ducturns based on Barber Colman non-adjustable 90 degree double wall type in all square elbows.
- D. Provide on all branch duct takeoffs as shown in Barber Colman adjustable airturns.

2.9 REGISTERS, GRILLES AND DIFFUSERS:

- A. Registers, grilles and ceiling diffusers shall be furnished of size and type as shown on drawings, in Titus and Seiho or equal in Krueger or Metalaire. The cat. no.'s refer to equipment as manufactured by Titus.
- B. All registers and wall grilles furnished in steel shall be furnished in prime coat except where specified herein or shown on drawings to be aluminum construction or factory baked enamel.
- C. Refer to schedule on drawings for type and finish of each grille.
- D. Provide all wall grilles and registers with all purpose frame.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- E. All registers and diffusers shall be compatible with ceiling specified under Architectural.

2.10 FAN DRIVES:

- A. Furnish each V-belt drive with variable pitch motor pulley unless otherwise specified.
- B. Fan manufacturer shall furnish factory standard belt guard for all exposed drives. Field constructed guards will not be approved. Furnish all belt guards with prime coat.

2.11 CANVAS JOINTS:

- A. On each side of each centrifugal or centriline fan and at each air handling unit having duct connections, furnish Ventfabric Tape for expansion and elimination of sound travel in ductwork.
- B. Furnish and install Doro-Dyne Insuflex, insulated flexible duct connector at all locations where the duct crosses an expansion joint.

2.12 VIBRATION ISOLATION:

- A. All mechanical equipment shall be mounted on or suspended from approved and specified foundations and supports.
- B. All floor mounted equipment shall be erected on 4" high reinforced concrete house - keeping pads (by General Contractor)
- C. All vibration isolation systems shall be guaranteed to have the static deflections required to warrant a 98% isolation efficiency. The vibration isolation system shall be installed in accordance with the manufacturer's instructions.

PART 3 - EXECUTION

3.1 GENERAL FOR EQUIPMENT:

- A. Refer to schedule on drawings for size, type, design capacities and characteristics of fans. Also required accessories shall be indicated in schedule or listed herein.
- B. Provide and install all additional structural supports for fans, and air handling equipment, not provided for by the General Contractor.
- C. Provide and install vibration eliminators of type and size approved and recommended by the fan manufacturer for the particular application and arrangement of fan installation.
- D. Provide and install flexible joints on either side of fan.
- E. Furnish all combination disconnect switches and starters for fans unless otherwise called for.
- F. This Contractor is responsible for all internal wiring between separate air handling equipment sections.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- G. All equipment on base drawings, including air handling units, have been dimensionally coordinated with the architectural and structural drawings. If this Contractor proposes to substitute any equipment other than which is on the basic bid drawings, for review, he shall first verify that the proposed equipment will fit dimensionally.
This Contractor shall be responsible for any additional costs to changes incurred because of the above substitution even after review by the Engineer.
- H. Provide service disconnect switches mounted on all rooftop equipment.

3.2 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round and flat-oval ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

3.3 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.4 DUCT SEALING

- A. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

Outdoor, Supply-Air Ducts: Seal Class A.

Outdoor, Exhaust Ducts: Seal Class C.

Outdoor, Return-Air Ducts: Seal Class C.

Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.

Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.

Unconditioned Space, Exhaust Ducts: Seal Class C.

Unconditioned Space, Return-Air Ducts: Seal Class B.

Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.

Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.

Conditioned Space, Exhaust Ducts: Seal Class B.

Conditioned Space, Return-Air Ducts: Seal Class C.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:

Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.

Test the following systems:

- 1 Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections totaling no less than 25 percent of total installed duct area for each designated pressure class.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

2. Supply Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
3. Return Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
4. Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
5. In addition to above, test any VAV system duct of 1" and ½" construction class that is upstream of the VAV box.

Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.

Test for leaks before applying external insulation.

Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.

Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

Visually inspect duct system to ensure that no visible contaminants are present.

3.6 STRUCTURAL SUPPORT:

- A. Main dunnage steel shall be provided under another section; however, this Contractor shall provide all supplementary steel for the complete support of equipment.

3.7 DESCRIPTION OF SUPPLY AND RETURN AIR/EXHAUST SYSTEM:

- A. Furnish and install the complete horizontal and vertical ducts for each system between all AHU's , and registers and grilles. For all centrifugal fans, furnish flexible joints either side of fan and extend the fan discharge ducts to wall openings and louvers or other openings as indicated; near wall outlet provide hinged access door with lock for access to damper.
- B. Furnish automatic fire dampers with fusible link on all ducts passing through floors or fire walls, and motorize smoke dampers in all ducts passing through smoke partitions and at each such damper, furnish accessible access door.
- C. Friction dampers shall be installed in all branch ducts made accessible for adjustment near registers or grilles. For exact type of grilles or registers, refer to drawings.
- D. Furnish angle frames to suit construction for all registers and grilles complete with plaster stops.
- E. Furnish on each fresh air intake an opposed blade manual damper between louver and motorized damper.
- F. Sizes and approximate locations of all ducts are shown on the drawings. Check carefully with the architectural and structural drawings and drawings showing work of other trades to make sure that there will be no conflict between these trades and the ducts.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- G. Coordinate the installation of setting frames and registers in order that details as shown on drawings are adhered to. Wood rounds shall be furnished and installed as shown on architectural detail.
- H. All ductwork shall be installed as shown on drawings and is to be rigidly braced and supported to prevent vibration and sagging.
- I. All hangers and supports are to be fastened securely to concrete, wood or steel construction. Under no circumstances will hangers be inserted supported on suspended ceilings, conduits or pipe be permitted.
- J. All vertical ducts shall be supported at each floor level by means of angle iron riveted securely to ducts.
- K. Refer to Section 200050 for coordinated drawings.
- L. Contractor shall provide all labor and materials as required to assist the Balancing Contractor in proper balancing of the air systems. Contractor shall return to the job and shall make the necessary adjustments and corrections to the systems as required by the Balancing Contractor in order to achieve satisfactory system performance in accordance with design parameters.
- M. This Section shall be responsible for any necessary changes in pulleys and belts required to obtain proper air delivery and shall provide additional dampers, splinters, turning vanes, turbulence vanes and other devices if necessary to obtain the correct system performance, all as directed by the Owner's or its Representative.

END OF SECTION 23 31 13

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 236313 – AIR COOLED CONDENSING UNIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.
- B. The General Requirements in Section 200050 shall also govern the work under this Section.
- C. Examine all drawings and data and coordinate the work of this Section with all related and adjoining work.

1.2 SCOPE OF WORK:

- A. Air Cooled Condensing Unit rated in accordance with AHRI Standard 365

1.3 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. Fabricate and label refrigeration system according to ASHRAE 15, "Safety Standard for Refrigeration Systems."
- C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.4 SUBMITTALS:

- A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics and connection requirements.
- B. Product Data:
 - 1. Provide literature that indicates dimensions, weights, capacities, ratings, and electrical characteristics and connection requirements.
- C. Operation and Maintenance Data: For air-cooled refrigerant condensers to include in emergency, operation, and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver, store, protect and handle products to site.
- B. Handle carefully to avoid damage to components, enclosures, and finish

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- C. Store in a clean, dry place to protect from weather and construction traffic.

1.6 OPERATION AND MAINTENANCE DATA:

- A. Maintenance Data: Provide instructions for installation, maintenance and service

1.7 QUALIFICATIONS:

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.
- B. Startup must be done by trained personnel experienced with split systems.
- C. Do not operate units for any purpose, temporary or permanent, until remote controls are in place, and manufacturers' installation instructions have been followed.

1.8 WARRANTY:

- A. Unit shall have a minimum 18 month warranty (parts and labor) for all units specified under this section starting from Date of Substantial Completion.
Manufacturer shall guarantee this product against any manufacturing or material defect. The warranty shall cover the repair and/or replacement of defective parts (including labor) that have been subjected to regular use and maintenance.
- B. Provide 5 year compressor warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, condensing units shall be manufactured by **Daikin**. Other manufacturers offering similar products may be incorporated, they include and are limited to, the following:
 - 1. Daikin, basis of design
 - 2. York
 - 3. AAON

2.02 GENERAL DESCRIPTION

- A. Furnish as shown on plans, Condensing Unit(s) . Unit performance and electrical characteristics shall be per the job schedule.
- B. Configuration: Fabricate as detailed on prints and drawings.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- C. The complete unit shall be ETL listed.
- D. Unit shall be completely factory assembled and shipped in one piece.
- E. Unit to be shipped with a nitrogen holding charge only.
- F. The unit shall undergo an operational test prior to shipment. The factory test shall include a refrigeration circuit check test, a unit safety control system operations checkout, and a final unit inspection.
- G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.
- H. Performance: All scheduled capacities and face areas are the minimum accepted value. All scheduled amps, KW, and HP are maximum accepted values that allow scheduled capacity to be met.

2.03 CABINET

- A. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished surface to withstand a minimum 750-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.
- B. The unit base frame shall be constructed of 13 gauge pre-painted galvanized steel.
- C. Lifting brackets shall be provided on the unit base with lifting holes to accept cable or chain hooks.

2.04 ELECTRICAL

- A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with unit shall be number and color coded and labeled according to the electrical diagram provided for easy identification.
- B. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch circuit short circuit protection, 115 volt control circuit transformer and fuse, system switches, and a high temperature sensor. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Knockouts shall be provided in the side of the main control panels for field wiring entrance.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- C. All 115-600 volt internal and external wiring between control boxes and components shall be protected from damage by raceways or liquid tight conduit.
- D. The receptacle shall be powered by a field supplied 115V source.
- E. Single terminal block shall be provided for connecting electrical power at the unit.
- F. Unit SCCR rating to be 10 kAIC.
- G. Phase failure and under voltage protection shall be provided to prevent damage from single phasing, phase reversal, and low voltage conditions.
- H. Ground fault protection on three-phase motors shall be provided to protect against arcing ground faults.
- I. Unit shall be provided with a 24 volt transformer and terminal strip for field supplied controls.

2.05 DISCHARGE AND RETURN PLENUM OPTIONS

- A. A supply air discharge plenum shall be provided. The plenum section shall have a discharge opening.

2.06 CONDENSING SECTION

- A. **Air Cooled Condenser**
 - 1. The condensing section shall be open on the sides and bottom to provide access and to allow airflow through the coils. Condenser coils shall be multi-row and fabricated from cast aluminum micro-channel coils. Each condenser coil shall be factory leak tested with high-pressure air under water. Coils are to be recessed so that the cabinet provides built in hail protection.
 - 2. Condenser fans shall be direct drive, propeller type designed for low tip speed, vertical air discharge, and include service guards. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, inherently protected, three-phase, non-reversing type with permanently lubricated ball bearing and integral rain shield.
 - 3. Units shall have at least one head pressure sensing condenser fan controlled to maintain positive head pressure. An ambient thermostat shall prevent the refrigeration system from operating below 45° F ambient. SpeedTrol™ condenser fan speed control shall be added to the last fan off on each refrigeration circuit to provide cooling operation to ambient temperatures down to 0° F. Fan speed control shall be field adjustable.
- B. **Refrigeration Circuit**
- C. Hot gas bypass capped T shall be factory installed on the discharge line of refrigerant circuits.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

2.07 CONTROLS

- A. Refrigeration capacity control shall be accomplished by the modulation of the digital scroll compressor and staging of fixed compressor(s). Unit shall be equipped with a 120V terminal strip for field supplied and installed controls.

PART 3: EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of air-cooled refrigerant condensers.
- B. Examine roughing-in for refrigerant piping systems to verify actual locations of piping connections before equipment installation.
- C. Examine walls, floors, and roofs for suitable conditions where air-cooled condensers will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install unit level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.
- B. Equipment Mounting:
 - 1. Comply with requirements for vibration isolation and seismic control devices specified on drawings
- C. Maintain manufacturer's recommended clearances for service and maintenance.
- D. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in Section 232113 "Hydronic Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Refrigerant Piping: Connect piping to unit with pressure relief, service valve, filter-dryer, and moisture indicator on each refrigerant-circuit liquid line.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

Perform electrical test and visual and mechanical inspection.

Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Complete manufacturer's starting checklist.

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

Verify proper airflow over coils.

Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

C. Air-cooled refrigerant condensers will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and perform the following:

- Inspect for physical damage to unit casing.
- Verify that access doors move freely and are weathertight.
- Clean units and inspect for construction debris.
- Verify that all bolts and screws are tight.
- Adjust vibration isolation and flexible connections.
- Verify that controls are connected and operational.

- Lubricate bearings on fan motors.
- Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
- Adjust fan belts to proper alignment and tension.
- Start unit according to manufacturer's written instructions and complete manufacturer's startup checklist.
- Measure and record airflow and air temperature rise over coils.
- Verify proper operation of capacity control device.
- Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
- After startup and performance test, lubricate bearings.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-cooled refrigerant condensers.

END OF SECTION 23 63 13



**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 237313 - CUSTOM AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.
- B. The General Requirements in Section 200050 shall also govern the work under this Section.
- C. Examine all drawings and data and coordinate the work of this Section with all related and adjoining work.

1.2 SCOPE OF WORK:

- A. Indoor mounted variable Air Handling Units

1.3 QUALITY ASSURANCE:

- A. Air Handling Units: Product of manufacturer regularly engaged in production of components who issues complete catalog data on total product offering.
- B. Variable and Constant Volume Air Handling Units: Certify air volume, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430. If air handling units are not certified in accordance with ARI 430, contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.
- C. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with ARI 410-87.

1.4 SUBMITTALS:

- A. Submit unit performance including: capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations. Indicate unit shipping, installation and operating weights including dimensions.
- D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Units shall ship fully assembled up to practical shipping and rigging limitations. Units not shipped fully assembled shall have tags and airflow arrows on each section to indicate location and orientation in direction of airflow. Each section shall have lifting lugs or shipping skid to allow for field rigging and final placement of section.
- B. Deliver units to site with fan motors, sheaves, and belts completely assembled and mounted in units.
- C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.6 ENVIRONMENTAL REQUIREMENTS:

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.7 EXTRA STOCK:

- A. Provide one extra set of clean filters, in addition to the ones to be installed in the unit before it is turned over to the Owner.

1.8 WARRANTY:

- A. Unit shall have a minimum 18 month warranty (parts and labor) for all units specified under this section starting from Date of Substantial Completion.
Manufacturer shall guarantee this product against any manufacturing or material defect. The warranty shall cover the repair and/or replacement of defective parts (including labor) that have been subjected to regular use and maintenance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, all air-handling units shall be manufactured by **Daikin**. Other manufacturers offering similar products may be incorporated, they include and are limited to, the following:
 - 1. Daikin, basis of design
 - 2. Temtrol
 - 3. York

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

2.2 MANUFACTURED UNITS

- A. General Description: Factory assembled, consisting of fans, motor and drive assembly, coils, dampers, plenums, filters, drip pans, mixing dampers and other accessories as indicated on drawings or schedules.
- B. Motor and Electrical Components: Refer to Division 26 Section "Electrical Requirements for Mechanical Equipment."

2.3 AIR HANDLING UNITS

- A. GENERAL: This specification covers the performance requirements and the material/construction requirements of custom-built air handling units. The detailed performance and data sheets and/or equipment schedule drawing(s) are considered part of this specification.
- B. Warranty: The manufacturer shall provide the parts warranty for equipment manufactured and all vendor supplied components. The said warranty shall cover replacement of all defective parts for a period of 18 months from the time of substantial completion.
- C. Submittal: The successful manufacturer shall provide Shop drawings and submittal data for review. The submittals and shop drawings shall be complete in all respects including the following information:
 - 1. Overall unit dimensions and individual components and section dimensions.
 - 2. Sound analysis consisting of inlet, outlet and radiated sound power levels per unit performed by an AMCA 300 accredited lab.
 - 3. Shipping and operating weight of unit and/or sections.
 - 4. Materials of construction.
 - 5. Cross section details of typical wall, floor and roof construction.
 - 6. Component equipment data as detailed in component specification section.
 - 7. Unit performance data including sound data.
 - 8. Details of coil support in a coil bank.
 - 9. Piping connection sizes and approximate locations.
 - 10. Door and window sizes and elevations.
 - 11. Drain pan details.
 - 12. Operating and Maintenance Data
- D. Product Delivery, Storage and Handling
All equipment shall be delivered to the job site suitably packaged and protected for overland

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

trucking using heavy-duty protective shrink-wrap plastic. Where multiple units are required, a schedule of priority will be furnished which shall determine the manufacturing and delivery sequence. In general, units shall be delivered in one piece unless indicated otherwise. Where building constraints, unit size or trucking limitations require that units ship in more than one piece, the manufacturer shall indicate all split points on the shop drawings. All items shipped loose such as filters, steam humidifier assemblies, caulking, etc. shall be itemized on the packing slip and be suitably secured in the unit or on a separate pallet.

E. General Design Considerations

Coils shall be arranged so that space between coils is a minimum of 24", unless specifically shown otherwise on drawings. Fan compartment shall be arranged such that the space between the fan inlet(s) and the housing is a minimum of 75% of fan diameter, unless noted or shown otherwise on the schedule or drawings. Coil assembly shall have provisions to facilitate total or partial removal from coil bank. Housing shall be designed and sealed to minimize air and water vapor leakage. Housing shall be designed and tested to meet maximum leakage of SMACNA class 3 when tested in accordance with the procedure outlined in the SMACNA HVAC Air Duct Leakage Manual.

F. Factory Testing

The units noted below shall be tested by the unit manufacture prior to shipping. Factory testing shall be done on the assembled unit.

2.4 UNIT CONSTRUCTION

A. Unit Base / Floor / Frame Work:

Floor liner shall be 16-ga, G-90 galvanized steel. Floor seams shall be sealed to create leak free joints. The under floor liner shall be G-90 galvanized steel and recessed nominal 1/2" to allow for air circulation under the unit floor. All floor openings on outdoor units are complete with floor grating. The entire unit base must be polyurethane foamed in place with a minimum thickness of 3" and a minimum R value of 20. **Fiberglass insulated unit bases will not be acceptable.** Maximum deflection of floor shall be L/360 at design loading (L=span in inches), the minimum floor design load is 150 lbs/sqft (distributed load), and the maximum point load on floor shall be 300 lbs (over 1 square foot).

B. Cabinet Insulation:

The polyurethane injected foam, 2.5 pcf with an effective thermal conductivity (C) of 0.154 BTU in/hr sq.ft°F). The foam insulation has an ozone depletion potential of 0, a global warming potential of 0 and is VOC exempt. It is also rated UL94 HF-1.

C. Cabinet – Smooth Exterior Panels:

Formed and reinforced wall panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

Outside Casing shall be solid 16-ga, Bright spangled G-90 galvanized steel, double die-formed 3" thick panel secured with 1/4" hex head, zinc plated fasteners. All wall and ceiling panels are not to exceed 24" in width for structural integrity. The inside liner shall be 20-ga solid, G-90 galvanized steel. Liner shall be secured with PK-coated sheet metal screws to unit casing every 12".

Under normal internal operating design conditions, there shall be no condensation on the unit

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

exterior at the following ambient conditions:

Indoor units	105°F DB,	80°F WB
Outdoor units	115°F DB,	80°F WB

D. Knocked down unit construction

Unit shall be shipped in pieces small enough to fit through the available opening(s), yet large enough to minimize work required in the field by installing contractor. Each piece or assembly of pieces shall be clearly marked and refer to a clear and concise assembly drawing. Factory personnel can be provided to supervise the assembly from start to finish (upon request and availability). Manufacturer shall guarantee the performance of the field assembled units just as if they were built in the factory. Approval by factory personnel shall confirm that installing contractor followed all assembly procedures and that unit will perform as specified.

E. Drain Pans and Cooling Coil Support Structure

Condensate Drain Pans are IAQ design, 18-ga., 304 stainless steel and incorporate a double slope shape to eliminate standing water. All drain pans have a "Double Bottom" attached to welded structural steel base, with a minimum of 1.25" of polyurethane spray foam insulation under the drain pan under the lowest point. Drain connections are standard stainless steel 1-1/4" MPT connection. All coils are self supported to reduce unit height to a minimum. All coils shall be mounted on raised supports above drain pan to facilitate cleaning and coil removal. Coils shall have independent removable access panels on both sides of the coil to allow for coil pull.

2.5 ACCESS DOORS AND PANELS:

- A. Access doors are constructed with a double wall construction and an extruded aluminum frame. The door frame features a built-in no-through-metal high density resin barrier and a perimeter gasket. **Door frames with no thermal break are not acceptable.** The door gasket is seamed together at each corner to prevent leakage through the door. Door is attached to the unit with **3 axes adjustable stainless steel hinges**. Doors shall open against higher pressure side. Where this is not feasible due to site constraints, an interlocking mechanism furnished on the fan section access door with a de-energizing switch complying with CAL-OSHA, ETL and the mechanical protection requirements of UL 1995 will be provided.
- B. Inspection access panels and doors shall be sized and located to allow periodic maintenance and inspections.
- C. Dual-paned tempered glass with vacuum seal windows, molecular sieve sealant and thermally broken frames shall be supplied. **Singled paned windows are not acceptable.**
- D. All outward swinging doors must be equipped with a door chain to limit door swing.

2.6 FAN ASSEMBLY

- 1. Acceptable fan assembly shall be a double width, double inlet, class II, belt-drive type housed airfoil fan dynamically balanced as an assembly, as shown in schedule. Maximum fan RPM shall be below first critical fan speed. Fan assemblies shall be dynamically balanced by the manufacturer on all three planes and at all bearing supports. Copper lubrication lines shall be provided and

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

extend from the bearings and attached with grease fittings to the fan base assembly near access door. If not supplied at the factory, contractor shall mount copper lube lines in the field. Fan and motor shall be mounted internally on a steel base. Provide access to motor, drive, and bearings through hinged access door.

2. Fan and motor shall be mounted internally on a steel base. Factory mount motor on slide base that can be slid out the side of the unit if removal is required. Provide access to motor, drive, and bearings through hinged access door. Fan and motor assembly shall be mounted on 2" deflection spring vibration type isolators inside cabinetry. Seismic snubbers shall be provided.

2.7 VIBRATION ISOLATION BASE

All isolation devices shall be selected for uniform static deflections according to distribution of weight. Minimum isolation efficiency shall be 90 - 95%.

Structural steel integral base shall be tailored to accommodate the equipment, including electric motor slide base and space saving isolator mounting brackets to minimize equipment mounting height. Minimum beam height-to-length ratio is 10% but height shall not be less than 4".

2.8 COILS

1. Certification: Acceptable water cooling, water heating, steam, and refrigerant coils shall be certified in accordance with AHRI Standard 410 and bear the AHRI label. Coils exceeding the scope of the manufacturer's certification and/or the range of AHRI's standard rating conditions will be considered provided the manufacturer is a current member of the AHRI Forced Circulation Air-Cooling and Air-Heating Coils certification programs and that the coils have been rated in accordance with AHRI Standard 410. Manufacturer must be ISO 9002 certified.
2. Water heating coil shall be provided. Provide access to coil(s) for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 5" beyond unit casing for ease of installation. Drain and vent connections shall be provided exterior to unit casing. Coil connections must be factory sealed with grommets on interior and exterior panel liners to minimize air leakage and condensation inside panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.
 - a. Headers shall consist of seamless copper tubing to assure compatibility with primary surface. Headers to have intruded tube holes to provide maximum brazing surface for tube to header joint, strength, and inherent flexibility. Header diameter should vary with fluid flow requirements.
 - b. Fins shall have a minimum thickness of 0.0075 inch aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.
 - c. Coil tubes shall be 5/8 inch OD seamless copper, 0.020 inch nominal tube wall thickness, expanded into fins, brazed at joints.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- d. Coil connections shall be carbon steel, threaded connection. Connection size to be determined by manufacturer based upon the most efficient coil circuiting. Vent and drain fittings shall be furnished on the connections, exterior to the air handler. Vent connections provided at the highest point to assure proper venting. Drain connections shall be provided at the lowest point to insure complete drainage and prevent freeze-up.
- e. Coil shall be furnished as an uncased galvanized steel to allow for thermal movement and slide into a pitched track for fluid drainage.
- 3. Direct expansion refrigerant cooling coil shall be provided. Provide access to coil(s) for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 3" beyond unit casing for ease of installation. Coil connections must be factory sealed with grommets on interior and exterior panel liners to minimize air leakage and condensation inside panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.
 - a. Sweat type copper suction headers shall be provided.
 - b. Fins shall have a minimum thickness of 0.0075 inch aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.
 - c. Coil tubes shall be 5/8 inch OD seamless copper, 0.020 inch nominal tube wall thickness, expanded into fins on 1 1/2-inch centers, brazed at joints.
 - d. Sweat type copper suction connections located at the bottom of the suction headers for gravity oil drainage. Coils shall be uniformly circuited in a counterflow manner for either single circuit, row, face, interlaced, or interlaced face split capacity reduction as shown on unit schedule. Pressure type liquid distributors used. Coils shall be tested with 315 pounds air pressure under warm water, and suitable for 250 psig working pressure.
 - e. Coil casing shall be a formed channel frame of galvanized steel.

2.9 FILTERS, FILTER FRAMES, AND FILTER BANKS

- A. Pre-filters
The filter shall consist of a pleated media, media support grid, and enclosing frame. The media shall be non-woven cotton fabric and shall be designed to consistently increase efficiency throughout service life of filter with an initial Merv 8 rating. The media support shall be a welded wire grid with an effective open area of not less than 90%. The grid shall be bonded to the filter media to eliminate media oscillation and pull away. The enclosing frame shall be constructed of rigid, heavy duty, high wet strength beverage board. The frame shall be bonded to the filter pack. Standard sizes shall be 12" x 24" x 2" and 24" x 24" x 2". All filter holding frames must be caulked in between them to minimize bypass air through the frames. Filters shall be American Air Filter Perfect Pleat, or equal by Cam-Farr, Eco-Air or Airguard.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

B. Final Filter - Rigid Type

The filter shall be a high performance, deep pleated, totally rigid type and shall consist of a glass fiber media, media support frame, contour stabilizers, and enclosing frame. The filter media shall be a high density microfibre glass fiber laminated to a non-woven synthetic backing to form a lofted filter blanket. The media shall provide superior dust holding, moisture resistance and overall performance with an initial Merv 13 rating. The media support shall be a welded wire grid with an effective open area of not less than 96%. The grid shall be bonded to the filter media to eliminate media oscillation and pull-away. The grid shall support the media both vertically and horizontally. Contour stabilizers shall be permanently installed on both the air entering and exiting sides of the filter media pack to insure the pleat configuration is maintained throughout the life of the filter. The enclosing frame shall be constructed of galvanized steel. It shall be constructed and assembled to provide a rigid and durable enclosure for the filter pack. The frame shall be bonded to the filter pack. Standard filter sizes shall be 12" x 24" x 12" and 24" x 24" x 12". All filter holding frames must be caulked in between them to minimize bypass air through the frames. Filters shall be American Air Filter Rigifil, or equal by Cam-Farr, Eco-Air or Airguard.

C. Filter Frame Assemblies

Constructed of galvanized steel, specifically designed and sized to have matching mounting holes such that frames may be riveted together. Frame comes with pre-installed gasket so as to provide a surface onto which the filter will self-seal. Filter frames come with stiffeners which are installed between each column of filter frame. All filter holding frames are caulked in between them to minimize bypass air through the frames. Proper structural support (every 5 frames wide) is provided when reinforcement is required for attachment of frame assembly to existing AHU casing / building structure as well as complete safing and proper air seal.

2.10 DAMPERS

- A. Low leakage aluminum dampers as made by TAMCO. Dampers are made of extruded aluminum airfoil blades with extruded EPDM blade gaskets and extruded TPE frame seals, 7/16" aluminum hexagon shaft, aluminum linkage crankarm, aluminum pivot pin, acetal copolymer inner bearing and polycarbonate outer, and a 12-ga. aluminum frame.
- B. Low leakage TAMCO two deck multi-zone dampers have extruded aluminum airfoil blades, extruded EPDM blades gaskets, extruded TPE frame seals, 7/16" aluminum hexagon shaft, aluminum linkage crankarm, aluminum pivot pin, acetal copolymer (cecon) inner bearing and polycarbonate outer bearing, and a 12-ga. aluminum frame. The cold/hot decks are on a common shaft driven by one operator. [Actuator are furnished and mounted by VENTROL]. [Pneumatic] [Electric] specified in Division 15 Section "HVAC Instrumentation and Controls.

2.11 ELECTRICAL

- 1. Fan motors shall be manufacturer provided and installed, Open Drip Proof, premium efficiency (meets or exceeds EPA requirements), 1750 RPM, single speed, 200V / 60HZ / 3P. Complete electrical characteristics for each fan motor shall be as shown in schedule.
- 2. The air handler(s) shall be ETL and ETL-Canada listed by Intertek Testing Services, Inc. Units shall conform to bi-national standard ANSI/UL Standard 1995/CSA Standard C22.2 No. 236.
- 3. Wiring Termination: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclosed terminal lugs in terminal box sized to NFPA 70.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

4. Manufacturer shall provide ASHRAE 90.1 Energy Efficiency equation details for individual equipment to assist Building Engineer for calculating system compliance.
5. Installing contractor shall provide GFI receptacle within 25 feet of unit to satisfy National Electrical Code requirements.
6. All electrical connection components shall be field provided and mounted as shown on project schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Equipment Mounting:
 1. Install air-handling units on cast-in-place concrete equipment base or on metal frame as shown on drawings
- B. Arrange installation of units to provide access space around air-handling units for service and maintenance.
- C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with new, clean filters.
- D. Install filter-gage, static-pressure taps upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum in accessible position. Provide filter gages on filter banks, installed with separate static-pressure taps upstream and downstream of filters.

3.2 CONNECTIONS

- A. Comply with requirements for piping specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to air-handling unit to allow service and maintenance.
- C. Connect piping to air-handling units mounted on vibration isolators with flexible connectors.
- D. Connect condensate drain pans using copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.
- E. Hot- and Chilled-Water Piping: Comply with applicable requirements in Section 232113 "Hydronic Piping". Install shutoff valve and union or flange at each coil supply connection. Install balancing valve and union or flange at each coil return connection.
- F. Connect duct to air-handling units with flexible connections. Comply with requirements in Section 233113 "Metal Ducts".

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

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, fill water and steam coils with water, and test coils and connections for leaks.
 - 2. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Automatic-Roll-Filter Operational Test: Operate filters to demonstrate compliance with requirements. Test for leakage of unfiltered air while system is operating.
 - 4. HEPA-Filter Operational Test: Pressurize housing to a minimum of 3-inch wg or to designed operating pressure, whichever is higher; test housing joints, door seals, and sealing edges of filter with soapy water to check for air leaks.
 - 5. HEPA-Filter Operational Test: Pressurize housing to a minimum of 3-inch wg or to designed operating pressure, whichever is higher; test housing joints, door seals, and sealing edges of filter for air leaks according to ASME N510, pressure-decay method.
 - 6. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Air-handling unit or components will be considered defective if unit or components do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

- A. Perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Verify that shipping, blocking, and bracing are removed.
 - 3. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.
 - 4. Verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
 - 5. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factory-recommended lubricants.
 - 6. Verify that zone dampers fully open and close for each zone.
 - 7. Verify that face-and-bypass dampers provide full face flow.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

8. Verify that outdoor- and return-air mixing dampers open and close, and maintain minimum outdoor-air setting.
9. Comb coil fins for parallel orientation.
10. Verify that proper thermal-overload protection is installed for electric coils.
11. Install new, clean filters.
12. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.

B. Starting procedures for air-handling units include the following:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace fan and motor pulleys as required to achieve design conditions.
2. Measure and record motor electrical values for voltage and amperage.
3. Manually operate dampers from fully closed to fully open position and record fan performance.

3.5 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Comply with requirements in Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

3.6 CLEANING

- A. After completing system installation and testing, adjusting, and balancing air-handling unit and air-distribution systems and after completing startup service, clean air-handling units internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-handling units.

END OF SECTION 23 73 13



**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

SECTION 26 00 00 - GENERAL ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The General Provisions of the Contract, including General and Supplementary Conditions and Division 1, General Requirements, apply to the work specified in this Section.
- B. Section 260000, General Electrical, shall govern the work under all Sections of Division 26.

1.2 DESCRIPTION:

- A. Work Included: The electrical work shall consist of all labor, equipment and services required to complete, ready for correct operation, all of the work called for by the accompanying drawings and these specifications.
- B. The work shall include, but is not limited to:
 - 1. Demolition.
 - 2. Raceways and Boxes.
 - 3. Branch Circuit Wiring.
 - 4. Wiring Devices.
 - 5. Circuit Breakers.
 - 6. Panelboard.

1.3 SITE CONDITIONS:

- A. Prior to submitting bid, visit the site and identify existing conditions and difficulties that will affect work called for by the Contract Documents.
- B. No compensation will be granted for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observers. Include in the bid amount all demolition work required.
- C. The Contractor shall verify and obtain all necessary dimensions at the site.

1.4 DEFINITIONS:

- A. Furnish: The word "furnish" is used to mean "supply and deliver the referenced item to the project site, ready for unloading, unpacking, assembly, and installation".
- B. Install: The word "install" is used to describe operations at the project site involving the referenced item including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- C. Normally Occupied: The words "normally occupied" are used to mean "all rooms within a building except for crawlspaces, underground tunnels, attic spaces, mechanical rooms, telephone rooms, data distribution rooms, and electrical rooms".
- D. Or Approved Equal: The words "or approved equal" are used to mean "any product which in the opinion of the Engineer is essentially equal in quality, size, arrangement, appearance, construction, and performance to that product specified or shown on the drawings".
- E. Provide: The word "provide" means "to furnish and install the referenced item, complete and ready for the intended use".
- F. Remove: The word "remove" means "to disconnect from its present position, remove from the project site, and to dispose of in a legal manner".

1.5 QUALITY ASSURANCE:

A. Codes and Standards

- 1. All work under this section shall comply with the applicable requirements of the National Electrical Code, local electrical and other codes, laws, regulations and standards including those of all state authorities. Where references are made in laws codes regulation and standards, these documents, including the latest revisions and amendments in effect as of the date of bid opening, shall form part of these specifications. Upon completion of the work, the contractor shall furnish Certificates of Approval from the local inspection authorities having jurisdiction for approving materials, equipment, installation pertaining to the electrical work as may be required by the local and/or state authority for the issuance of a permanent Certificate of Occupancy. All expenses arising from the procurement of these Certifications shall be paid by the contractor and shall be included in the lump sum contract price.
- 2. In addition to complying with the specified requirements, comply with all Federal, State and Local Codes wherever applicable including the following: 2018 Connecticut State Building Code, 2015 IBC, 2018 Connecticut Fire Safety Code , 2015 International Fire Code, 2013 NFPA 72 National Fire Alarm Code, 2017 NFPA 70 National Electrical, 2015 International Energy Conservation Code, ICC/ANSI A117.1-2009 Accessible and Usable Buildings and Facilities, and ADA.
- 3. Comply with the requirements of the Local Authority Having Jurisdiction.
- 4. Materials and equipment shall be UL listed where standard has been established.
- 5. Perform tests required by specifications, Engineer's instructions, laws, ordinances or public authorities, approvals, and give Owner timely notice. Notify the Owner of dates for inspection by other authorities.
- 6. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern.
- 7. Reference made to codes and standards shall be interpreted as minimum requirements. Provide and perform work in excess of codes and standards as indicated by drawings or specifications.

B. Submittals

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1. The contractor shall submit for approval a complete list of materials, fixtures and equipment to be incorporated in the work. The list shall include manufacturer's names and catalog numbers, descriptive data, manufacturer's ratings and application recommendations, cuts, diagrams, performance curves and such other information as may be required by the Owner to judge compliance with the requirements of the contract and suitability to the application. Items on the list shall be clearly identified as to proposed application. Approval of materials and equipment will be based on manufacturer's published ratings. Submittal procedures shall be in accordance with Division 1 of these specifications.
 2. When directed by the Owner, the contractor shall submit in approved form for record, a Certificate of Compliance with a cited code or standard for the designated materials and equipment; such certificates may be accepted in lieu of samples. Any materials or equipment submitted for approval, which are not in accordance with the specifications requirements may be rejected.
 3. As part of the coordination work required of the contractor, installation drawings shall be prepared by the contractor as necessary. It is intended that these drawings be used to coordinate the work of the various trades and to clarify details of proposed assembly, erection and installation. Installation drawings shall be prepared when indicated in these specifications or on the electrical drawings, or when directed by the Owner for comment or approval when an installation condition or problem arises which the contractor wishes the Owner to review. All installation drawings submitted for review will be considered and treated as shop drawings and the requirements pertaining to shop drawings shall govern.
- C. Equipment alternates, substitutions, and deviations:
1. Wherever more than one manufacturer is mentioned in the specifications or on the drawings, any of those named shall be considered equally acceptable to that on upon which design was based, and providing all aspects of the specification are met insofar as quality, construction, performance, space requirements, noise levels and special accessories or materials, any of those named may be included in Contractor's bid.
 2. Bidders wishing to obtain approval on brands other than those specified by name shall submit their request to the Engineer not less than ten (10) business days before the date fixed for opening of bids. Approval by the Engineer will be in the form of an Addendum to the specifications issued to all prospective bidders, indicating that the additional brand or brands are approved as equal to those specified so far as the requirements of the project are concerned.
 3. Wherever a single manufacturer is used in the specifications or on the drawings and is followed by the words "or approved equal" the Contractor must use the item named or he may apply for an alternate equipment deviation.
 4. Alternate equipment to that specified or shown on the drawings, as proposed to be provided by the contractor, must be essentially equal in quality, size, construction, and performance to that item specified or shown on the drawings.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

5. Submittals for alternate equipment shall list all deviations and differences from the specified equipment. Failure to submit this list will result in rejection of the submittal. Any deviations and differences not listed but discovered after installation shall be rectified as directed by the Engineer at the Contractor's cost.
 6. Furnish samples of alternate equipment proposed to be provided when so requested by the Engineer.
 7. Where the Contractor proposes to use an item of equipment which differs from that upon which design was based, which requires any redesign of the structure, partitions, foundations, piping, wiring or of any other part of Mechanical, Electrical Layout, all such redesign, new drawings or detailing required shall be prepared by Contractor at his own expense for approval of the Engineer.
 8. Where approved substitutions or deviations require a different quantity, size or arrangement of structural supports, wiring, conduit, piping, ductwork, and equipment from that upon which design was based, all additional items required by the systems shall, with the approval of the Engineer, be furnished by Contractor at no additional cost to Owner.
- D. Allow sufficient time so that the delivery and installation of equipment will not be delayed as a result of the time required to review, process and transmit submittals, including resubmittals. Failure by the Contractor to transmit submittals to the Engineer in ample time for review and processing shall not entitle him to an extension of the Contract Time and no claim for an extension of time by reason of such default will be allowed.
- E. Submittals, shop drawings, and samples will be reviewed with reasonable promptness and will be stamped indicating appropriate action as follows:
1. "No Exceptions Taken" means that fabrication, manufacture, or construction may proceed providing submittal complies with contract documents.
 2. "Amend as Noted" means that fabrication, manufacture, or construction may proceed, providing the submittal complies with Engineer's notations and contract documents.
 3. "Resubmit" means that submittal, or equipment proposed to be provided, does not comply fully with the contract documents and that fabrication, manufacture, or construction shall not proceed. Resubmit in accordance with the Engineer's notations and contract documents.
 4. "Rejected" means that submittal does not comply with contract documents, or that equipment proposed to be provided does not comply with the specified requirements or is not equal or better in quality and performance than that item specified. Fabrication, manufacture, or construction shall not proceed. Resubmit in accordance with the contract documents and specified requirements.
- F. If material or equipment is installed prior to review, or without review, it shall be removed and replaced at no extra charge to the Owner if, in the opinion of the Engineer, the material or equipment is not in compliance with the Contract Documents.
- G. Record Drawings

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1. The contractor shall maintain an accurate record of all deviations in work as actually installed from work as indicated. This record shall be kept current and shall be kept available at the site for inspection. Upon completion of the work, and before final payment is authorized, marked prints with signed certifications of accuracy shall be delivered to the engineer.

H. Manuals

1. The contractor shall furnish to the Owner operating and maintenance instructions for each piece of equipment and each device.
2. The instructions shall provide detailed descriptions of the operation and maintenance of the equipment or device and shall include manufacturer's literature, detailed wiring diagrams, device internal wiring diagrams, characteristics curves and graphs, data sheets and descriptive literature. The instructions shall be furnished to the Owner 30 days prior to the completion of the building work.

I. Product Handling

1. All work, materials and equipment, whether incorporated into the building or not, shall be protected from damage due to moisture, dirt, plaster, concrete, or from carelessness.
2. All material and equipment which is damaged, including installed work, shall be repaired or replaced to the satisfaction of the Owner.
3. After work is complete, all equipment, including switchboards, transformers, panelboards, lighting fixtures and lamps, shall be cleaned of all construction dirt.

1.6 INTENT OF SPECIFICATIONS:

- A. It is the intent of these Specifications each subcontractor or equipment suppliers to furnish all equipment complete with all motors, drives and magnetic starters throughout for all equipment furnished under these specifications. The above shall also apply to any additions to this Contract, either as covered by and Addenda or Change Orders.
- B. The Electrical Contractor shall provide overload and short circuit protection for all motors unless provided by equipment supplier for packaged type equipment.

1.7 GUARANTEE FOR EQUIPMENT AND SYSTEMS:

- A. Refer to Specifications.
- B. The entire Electrical System included under this Section of the Specifications shall be guaranteed by this Contractor against original defects of equipment and workmanship for a period of 12 months from date of substantial completion, unless otherwise specified.

1.8 CUTTING AND PATCHING:

- A. Cutting and patching for all electrical work inside building shall be done in accordance with Division 1.

1.9 SLEEVES AND OPENINGS:

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- A. This Electrical Contractor shall furnish and install all necessary sleeves and openings as required to permit the installation of the electrical systems.

1.10 ACCESS PANELS:

- A. Provide access panels to make all junction and pull boxes accessible as required by The National Electrical Code.

1.11 PAINTING:

- A. All painting of electrical work will be done in accordance with Division 9 unless otherwise specified.

1.12 RUBBISH AND CLEANING:

- A. This Contractor shall be responsible for removal of all rubbish and trash created by the installation of the electrical systems and equipment from the job site. Contractor shall sweep clean all areas.

1.14 INSTRUCTIONS:

- A. The Superintendent of the electrical work for this particular project shall spend all necessary time required to instruct the custodians of the building, together with representatives from the Maintenance Department, in the installation including all special controls and devices installed or connected under this contract.

1.15 POWER SHUTDOWNS:

- A. Any power shutdown required for the completion of the electrical work shall be scheduled with the owner at least ten working days in advance and shall be done at owner's convenience.

1.17 SEISMIC:

- A. Provide seismic restraining devices on all required items of electrical equipment in accordance with the 2018 Connecticut State Building Code.

END OF SECTION 26 00 00

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

**SECTION 26 05 00 - BASIC ELECTRICAL MATERIALS & METHODS
PART 1 - GENERAL**

1.1 RELATED DOCUMENTS:

- A. The Bidding Requirements, Contract Forms and Conditions of the Contract, including General Conditions of the Contract for Construction, and Division 1 - General Requirements, apply to the work specified in this Section.
- B. Section 260000 General Electrical, shall also govern the work under this Section.
- C. This Section includes requirements that are binding on other Sections of Division 26.
- D. Examine all drawings, data, and coordinate the work of this Section with all related and adjoining work.

1.2 SCOPE:

- A. Scope of work consists of installation of materials to be furnished under this Section, and without limiting generality thereof consists of furnishing labor, materials, equipment, hoisting, plant, transportation, rigging, staging, appurtenances, and services necessary and/or incidental to properly complete all electrical work as shown on the drawings, as described in these specifications or as reasonably inferred from either as being required in opinion of the Owner.
- B. Work Included: Provide complete electrical services where shown on the drawings, as specified herein and as needed for a complete and proper installation including but not necessarily limited to:
 - 1. General
 - 2. Conduits & Raceways
 - 3. Equipment Labeling
 - 4. Wire and Cables
 - 5. Receptacles
 - 6. Outlet Boxes, Junction Boxes, Pull Boxes
 - 7. Cabinets
 - 8. Disconnect Switches
 - 9. Supporting Devices
 - 10. Grounding
 - 11. Panelboard

1.3 QUALITY ASSURANCE:

- A. Refer to Section 260000.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1.4 SUBMITTALS:

- A. Shop Drawings: Submit for all items listed in Paragraph 1.2.B.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. Provide only materials that are new and of type and quality specified, or approved equal. Where Underwriters' Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label.
- B. Provide materials and equipment necessary to make installation complete in every detail, and to conform to manufacturers' latest installation instructions, under this contract whether or not specifically shown on drawings or specified herein.

2.2 TEMPORARY FACILITIES:

- A. Refer to the requirements of Division 1 regarding temporary facilities.
- B. Scaffolding and other temporary construction shall be rigidly built in accordance with Local and State requirements. Remove from premises upon completion of work.
- C. Provide temporary construction required for electrical work as directed by the Architect and Engineer.

2.3 RACEWAYS:

A. Rigid Steel Conduit:

1. Shall be manufactured from high strength strip steel, shall be hot dipped galvanized with threads galvanized after cutting, and shall be chromated to form an additional protective layer. Rigid steel conduits shall be UL listed, shall meet the requirements of ANSI C80.1, and shall be as manufactured by Allied Tube and Conduit, Wheatland, or Calconduit.
2. Shall be used in outdoor locations where conduit is exposed to physical damage, sunlight or weather.
3. Shall be used for underground work.
4. Shall be used for horizontal and vertical underground sweeps, horizontal and vertical sweeps below concrete slabs, and for penetrations through concrete slabs.
5. Fittings, couplings and connectors shall be threaded and galvanized or cadmium plated.

B. Rigid PVC Conduit:

1. Shall be heavy wall schedule 40 PVC for underground work and extra heavy wall schedule 80 PVC for underground work below vehicular traffic areas.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

Joints and fittings shall be solvent welded all to ASTM standards for underground installation and in accordance with Article 352 of the National Electric Code.

2. May be used in lieu of rigid steel conduit for underground work except as noted in paragraph 2.3, A, 4 above.
3. The minimum size for running below slabs shall be 1 1/4" for both feeders and branch circuits.
4. Joints shall be made watertight.
5. Shall not be embedded in concrete slabs.
6. Shall not be used above ground.
7. Shall not be used for underground horizontal and vertical sweeps, horizontal and vertical sweeps below concrete slabs, or for penetrations through concrete slabs.
8. Furnish conduit system in Prime, Cantex, or JM Eagle.
9. Flexible PVC conduit (ENT) shall not be used.

C. Intermediate Steel Conduit:

1. Shall be manufactured from high strength flat steel that is cold-formed and electrically welded into a uniform tube, shall be hot dipped galvanized with threads galvanized after cutting, and shall be chromated to form an additional protective layer. Intermediate steel conduit shall be UL listed, shall meet the requirements of ANSI C80.6, and shall be as manufactured by Allied Tube and Conduit, Wheatland, or Calconduit..
2. Shall be used in interior locations where conduit is exposed to physical damage, or corrosive or wet environments.
3. Fittings, couplings and connectors shall be threaded and galvanized or cadmium plated.

D. Electrical Metallic Tubing:

1. Shall be manufactured from high grade mild strip steel, shall be hot dipped galvanized, and shall be chromated and lacquered to form additional protective layer. EMT conduit shall conform to UL 797 and ANSI C80.3 and shall be as manufactured by Allied Tube and Conduit, Wheatland, or Calconduit.
2. Connectors and couplings shall be galvanized steel set screw type. Provide gland compression type couplings and connectors for exposed work in wet locations.
3. Shall be used for all interior feeders except where noted differently on the drawings. Provide insulated throat grounding bushings for all feeder conduit connections to switchboards, panelboards, disconnect switches, wireways, and pull boxes.
4. Shall be used for all interior wiring in masonry partitions, above non-accessible ceilings, and where exposed to view.
5. Shall be used for all branch circuit homeruns and closing connections to panelboards. Do not use Type 'MC' cable for wiring exposed to view, in masonry partitions, above non-accessible ceilings, or for branch circuit homeruns.
6. Shall be used for all branch circuits feeding HVAC equipment and equipment requiring 3-Phase power.
7. Shall not be embedded in concrete slabs.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

E. Flexible Steel Conduit:

1. Shall be full wall steel flexible conduit, shall be manufactured from high grade strip steel and shall be hot dipped in a molten zinc bath. The steel strip shall be formed into interlocking convolutions that are continuously joined, metal to metal, assuring continuous grounding contact. Flexible steel conduit shall be UL listed and shall be as manufactured by AFC Cable Systems, Greenfield, Anaconda, or Electri-Flex.
2. Flexible steel conduit fittings shall be zinc plated malleable iron squeeze type connectors and zinc plate malleable iron combination couplings
3. May be used in short lengths where EMT cannot be installed due to interferences and obstacles.
4. Provide for final connections to motor driven equipment, transformers, recessed light fixtures, chain hung light fixtures, or where subject to vibration.

F. Liquidtight Flexible Steel Conduit:

1. Shall be similar to flexible steel conduit, but with pressure-extruded moisture and oil-proof outer jacket of gray polyvinyl chloride plastic. Liquidtight flexible steel conduit shall be UL listed (UL 360) and shall be as manufactured by AFC Cable Systems, Anaconda, or Electri-Flex.
2. Fittings, couplings and connectors shall be threaded, zinc plated, malleable iron liquidtight type.
3. Provide where located outdoors or in damp or wet areas for final connections to motor driven equipment, or where subject to vibration.
4. Do not use in environmental air plenum spaces.

G. Sleeves:

1. Provide EMT sleeves for each conduit and cable passing through interior walls, partitions, and floors.
 - a. Set pipe sleeves in place before wall, floor, or partition is finished.
 - b. Support conduit and cable free from sleeves.
 - c. Provide sleeves two pipe sizes larger than the conduit or cable passing through, or provide a minimum of 1/2" clearance.
2. Provide chrome plated escutcheon plates for each sleeve where exposed to view in finished areas.
3. Provide GPT Industries WSG galvanized steel wall sleeves for each conduit passing through foundation walls. Galvanized steel wall sleeves shall be schedule 40 steel pipe in sizes through 10" diameter and shall have a 0.375" wall thickness for sizes 12" diameter and larger. WSG galvanized steel wall sleeves shall have a 2" collar (water stop) at the mid-point of the sleeve. The 2" collar shall be continuously welded on both sides to the sleeve. Provide GPT Industries Link-Seal modular waterproof seals at all foundation wall sleeves. Where penetrating existing foundation walls provide a core drilled penetration and Link-Seal modular waterproof seal without the galvanized steel wall sleeve.

H. Surface Steel Wireway:

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

1. Wireways shall be code gauge galvanized steel, manufactured standard sections and fittings, with hinged and/or screw covers, indoors NEMA Type 1/Outdoors NEMA Type 3R, and shall be manufactured by Hoffman, Cooper, Square D, or Wiremold. Wireways shall be sized to code conductor fill requirements and shall be provided as required for job conditions.

2.4 METHODS AND MATERIALS FOR LABELING EQUIPMENT:

- A. Panelboards, Safety Switches:
 1. Non-metallic engraved nameplates shall be used to identify device. Nameplates shall be secured to equipment with two screws or rivets.
 2. Letters to be white on black background.
 3. Nameplate letters to be 1/4" high.
 4. Identification nomenclature shall be in accordance with plans. All name nomenclature shall be submitted for approval.
 5. Nameplates for panelboards shall include panel designation and voltage.
- B. Identify all fused disconnect switches with installed fuse size, i.e: Maximum fuse size = xxx amps. Identification shall be of the same method as specified in paragraph 2.4.A, except white letters on red background.
- C. Identify the covers of all junction boxes and pull boxes installed above ceilings and in unfinished spaces with branch circuit or feeder designations. Identification shall be done with black felt tip permanent marker in a neat and readily legible manner.
- D. Provide a typewritten adhesive label with an identification legend at the switchboard and at each panelboard identifying the color coding of the ungrounded conductors being supplied by the switchboard and each panelboard.

2.5 PANELBOARDS:

- A. Panelboards shall be furnished in Cutler-Hammer manufacture or approved equal in Square D.
- B. Panelboards shall be equipped with the following features:
 1. Bolt-on circuit breakers.
 2. Symmetrical interiors.
 3. Surface or flush trim as called for in schedule, door-in-door type.
 4. Flush key catch lock.
 5. Painted finish, ANSI-61 gray.
 6. Metal frame/plastic cover index card holder.
 7. Separate equipment ground bus.
 8. Fast latch trim and jacking screw adjustment.
 9. Split neutral.
 10. Connection accessible from front.
 11. Copper lugs (feeder cable connectors).
 12. 1000 amps per square inch density rated silver-plated copper busses.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

13. Copper ground bar.
 14. Black face/white core engraved nameplate fixed to panel w/ two screws or rivets.
- C. Indexing and Identification: After installations are complete, provide and mount under sturdy transparent shield in the directory frame of each panel door a neat, accurate and carefully typed directory properly identifying the lighting, receptacles, outlets, equipment and rooms which each branch circuit breaker controls.
- D. All circuit breakers feeding mechanical equipment shall be 'HCAR' rated.
- E. Circuit breakers shall be bolt-on type with short circuit interrupting rating as indicated in panel schedule.
- F. Circuit breakers shall be provided with copper line and load lugs (cable connectors).
- G. 20 Amp, 1-Pole circuit breakers shall be listed by the Manufacturer for use with #12AWG through #10 AWG conductor sizes.

2.6 SAFETY SWITCHES:

- A. All safety disconnect switches shall be furnished in heavy duty quick-make, quick-break, interlocking fusible or non-fusible, type as indicated on the drawings. Manufacturer shall be the same as provided for switchgear and panelboards.
- B. Provide enclosures clearly marked for maximum voltage, current and horsepower rating, and:
1. Indoors: NEMA Type 1.
 2. Outdoors or Damp or Wet Locations: NEMA Type 3R.
 3. Hosedown and Splashing Water Locations: NEMA Type 4.
- C. Furnish and install disconnect switches at each motor location except where combination switches and starters are furnished with equipment by others but are mounted by this contractor.
- D. Furnish and install weatherproof disconnect switch at each exterior located fan or motor location.
- E. Disconnect switches shall be of "lock-out" design to prevent opening of switch when in "ON" position.

2.7 MOTOR STARTER/DISCONNECTS AND VFD'S:

- A. Combination motor starter/disconnects and variable frequency drives (VFD's) will be supplied by other trades for motor driven equipment provided by them.
- B. The electrical contractor shall install the starter/disconnects and VFD's, and shall provide all power wiring to the units and from the units to the motors they control.

2.8 CONDUCTORS:

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- A. Conductors shall be provided in Cerro Wire Manufacture or comparable product in Southwire or Republic Wire.
- B. All feeder conductors shall be copper rated 600 volts, 90 deg. C., dry and wet locations, Type XHHW-2, color coded.
- C. All branch lighting and power conductors shall be copper rated 600 volts, 90 deg. C., dry and wet locations, Type XHHW-2, color coded.
- D. Grounding electrode conductors and bonding conductors shall be soft drawn copper, ASTM B3 solid bare copper for sizes smaller than #8AWG, ASTM B8 concentric stranded bare copper for sizes #8AWG and larger.
- E. Minimum gauge conductors shall be #12 AWG. Increase to #10 AWG for runs exceeding 75'-0", and #8AWG for runs exceeding 150'-0".
- F. Wire Size #8 AWG and larger shall be stranded. Wire of size smaller than #8 AWG shall be solid.
- G. Wire and cable conductors shall be soft drawn copper with conductivity of not less than 98 percent of ANSI Standard for annealed copper. Aluminum conductors shall not be used.

2.9 OUTLET, JUNCTION AND PULL BOXES:

- A. Provide outlet boxes as required for a complete installation.
- B. Outlet boxes for flush (concealed) work shall be code gauge galvanized steel and shall be of shapes and sizes to suit their respective locations and installations, and shall be provided with covers to suite their function and installation. Outlet boxes shall be equipped with fixture stud or straps where required.
- C. The minimum box size for all flush wall outlet boxes shall be nominal 4 11/16" square x 2 1/8" deep (2-gang) except where noted differently on the drawings. Provide larger size outlet boxes, or gangable type boxes where required for the installation.
- D. For lighting outlets, provide standard 4" octagon units with 4" round flat covers. Provide 3/8" malleable iron fixture studs and box hangers where required. For lighting fixtures make final connection with flexible conduit of sufficient length to allow fixtures to be repositioned.
- E. Surface mounted boxes for switches and receptacles shall be 1-1/2" minimum deep.
- F. For exposed work, provide drawn-type boxes with galvanized steel crushed corner exposed work covers. Provide cast boxes for work exposed to wet locations and where called for on the drawings.
- G. For above ground pull boxes, provide galvanized code-gauge sheet steel units with screwed on covers, of size and shape required to accommodate wires without crowding, and to suit

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

the location. Provide pull boxes as specified herein, as required for job conditions, and as follows:

1. Indoors: NEMA Type 1.
2. Outdoors or Damp or Wet Locations: NEMA Type 3R.
3. Hosedown and Splashing Water Locations: NEMA Type 4.

2.10 WIRING DEVICES:

A. All devices shall be furnished in Hubbell or comparable product in Cooper or Leviton. Devices specified herein are based on Hubbell unless otherwise noted. Device colors shall be as directed by the Engineer.

B. Receptacles:

1. Single and duplex convenience receptacles shall be heavy duty specification grade, 2 pole, 3 wire grounding, NEMA 5-20R, rated 20AMP at 125 Volts AC. Receptacles shall have a one-piece all brass wrap around mounting strap with integral ground contacts and ground tension retaining clips, tandem bypass contact, heat resistant thermoplastic rynite base, and high impact nylon face. Receptacles shall be back and side wired, shall have a back wired green ground terminal, automatic ground clip, and threaded brass square head center rivet assembly.

Single Receptacle #HBL5361
Duplex Receptacle #HBL5362WR

2. Ground Fault Duplex convenience receptacles shall be heavy duty specification grade, 2 pole, 3 wire grounding, NEMA 5-20R, rated 20AMP at 125 volts AC. Receptacles shall have a solid brass wrap around mounting strap with pre-tensioned ground contacts, tandem modified bypass contacts, all glass circuit board with conformal coating for superior moisture immunity, 7 noise filtering capacitors, heat resistant thermoplastic base and high impact nylon face. Receptacles shall be back and side wired and shall have a green ground terminal.

Duplex GFCI Receptacle #GFR5362SG

C. Weatherproof Enclosures:

1. Weatherproof enclosures for outdoor GFCI receptacles shall be cast aluminum, single gang vertical Hubbell #WP26M or single gang horizontal Hubbell #WP26MH. Enclosures shall include gasket and mounting screws, shall have ¼" diameter padlock holes, and shall have large cord openings for use with cover closed.

2.10 FUSES:

A. Provide current limited, non-renewable fuses, Bussman, Littelfuse, or Gould, UL class J up to 600 Amp and Class L over 600 Amp.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- B. Fuses shall be rated 600V or less A.C., UL listed, and have minimum interrupting rating of 200,000 rms amperes with peak let-through current and maximum clearing values within prescribed UL limits. Fuses for motor feeders or motor circuits shall be Class RK-5 of voltage classification rated for motor with minimum interrupting capacity of 200,000 rms amperes and with minimum time delay of ten seconds at 500%.

2.13 OTHER MATERIALS:

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the contractor subject to the approval of the engineer.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Unless specifically noted or shown otherwise, install all equipment and material specified herein or shown on drawings whether or not specifically itemized herein. PART 3 covers particular installation methods and requirements peculiar to certain items and classes of materials and equipment.
- B. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until satisfactory conditions are corrected.
- C. The electrical drawings are diagrammatic, but are required to be followed as closely as actual construction and work of other trades will permit. Where deviations are required to conform with actual construction and the work of the other trades, make such deviations without additional cost to the Owner.
- D. Data indicated on the drawings and in these specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels and other conditions will be governed by actual construction and the drawings and specifications should be used only for guidance in such regard.
- E. Verify all measurements at the building. No extra compensation will be allowed because of differences between work shown on the drawings and actual measurements at the site of construction.
- F. Do not scale drawings. Scale indicated on drawings is for establishing reference points only. Actual field conditions shall govern all dimensions.
- G. Coordinate:
 - 1. Coordinate as necessary with other trades to assure proper and adequate provisions in the work of those trades for interface with the work of this Section.
 - 2. Coordinate delivery of electrical equipment to project prior to installation. Equipment stored for an extended period of time prior to installation may be subject to rejection by Architect.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

3. Coordinate the installation of electrical items with the schedule for work of other trades to prevent unnecessary delays in the total work.
4. Where electrical items are shown in conflict with locations of structural members and mechanical or other equipment, provide required supports and wiring to clear the encroachment.
5. Arrange installation to provide access to equipment for easy maintenance and repair.

3.2 INSTALLATION OF RACEWAYS AND FITTINGS:

- A. Install wire and cable in approved raceways as specified and as approved by authorities having jurisdiction.
- B. Provide code sized conduit unless a larger size is shown on the drawings or specified herein. Minimum size shall be ¼" diameter.
- C. Provide double locknuts on all conduits terminating in sheet metal enclosures.
- D. Provide expansion couplings for rigid metallic and non-metallic conduits where such conduits are subject to thermal expansion and contraction.
- E. Where conduit is installed underground or is exposed to weather or wet areas make all joints watertight.
- F. Install rigid galvanized steel conduit with ends cut square without sharp edges, threaded, and I.D. reamed to remove any burrs. Field made bends shall be of equivalent radius as factory made bends. Exposed threads shall be kept to a minimum.
- G. Carefully clean and dry all conduit before installation of conductors. Provide Prime conduit plugs and end caps to exclude dust, dirt, and debris during construction.
- H. Lubricants or cleaning agents which might have deleterious effect on conductor coverings shall not be used for drawing conductors into raceways.
- I. Provide minimum 3/16 inch diameter twisted nylon fish cord in all empty raceways. Provide tag on each end indicating location of other end. Fish cord shall have minimum of 200 pounds tensile strength.
- J. All wiring shall be installed in electrical metallic tubing unless otherwise specified herein or called for on the drawings.
 1. Where conduit is installed underground (buried), provide PVC conduit.
 2. Use flexible conduit for final connections to motor driven equipment or where subject to vibration. Where such equipment is located in wet areas or exposed to weather use liquid-tight flexible conduit. Flexible connections shall be minimum of 18 inches and maximum of 6 feet long with grounding conductor. Flexible connections shall be used prior to attachment of conduit to equipment housing.

3.3 CONDUCTOR INSTALLATION:

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

A. General:

1. The interior of all conduits shall be cleared of burrs, moisture, dirt and obstructions before wires are pulled.
2. Lubricant for pulling wires shall be inert to cable and conduit, shall not in any way restrict ease of pulling through conduit with passage of time, and shall be special lubricant designed specifically for cable pulling and shall be chemically compatible with cable.

B. Color Coding:

1. Consistent phase identification of all conductors shall be maintained as follows:

	<u>120/208V</u>	<u>277/480V</u>
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral Wire	White	Natural Grey

Provide colored plastic tape of specified color code identification for large size conductors available only in black. Wrap tape three complete turns around conductor, at ends and at connections and splices. Provide same color coding for switch legs as corresponding phase conductor.

C. Minimum Conductor Sizes:

1. The minimum branch circuit conductor size shall be #12AWG. Provide #10AWG conductors for branch circuits where the conductor run exceeds 75 feet, and #8AWG conductors where the conductor run exceeds 150 feet.

D. Provide the number of conductors required for a given branch circuit, or as required for circuitry, whether indicated on the drawings or not.

E. Neutral Conductors:

1. All branch circuits shall be installed with a separate neutral conductor. Shared neutrals for groups of branch circuits shall not be permitted.

F. Provide each circuit with a dedicated ground wire back to its respective panel ground bar. Size all ground wires in accordance with NEC requirements. Use #12 minimum size.

G. Identify conductors passing through pull boxes, junction boxes, and wireways to indicate circuit designation. Identify pull boxes and junction boxes as specified herein.

H. Phase conductors shall be connected to phase supply mains in proper rotation to assure balanced condition on panel. Circuit numbers assigned on drawings are for convenience only. Provide typed circuit directories for all panelboards at conclusion of work, representing circuits as actually connected to panelboard.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- I. Branch circuit wiring and arrangement of home runs have been designed for maximum economy consistent with adequate sizing for voltage drops, circuit ampacities and other considerations.
 1. Install the wiring with circuits arranged as shown on the drawings, except as otherwise approved in advance by the Engineer.
 2. Do not make changes and rearrange circuits without prior approval.
 3. If more than 3 current carrying conductors are installed in one conduit they shall be derated in accordance with the National Electric Code. Do not install more than three 30 Amp single phase or four 20 Amp single phase circuits in the same conduit.

J.Splices and Connections:

1. Makes splices electrically and mechanically secure with pressure-type connectors.
 - a. For wires size #8AWG and smaller, provide solderless, screw-on connectors, "Scotch-Lock" or equal, 600V rating, of size and type to manufacturer's recommendation, with temperature ratings equal to the conductor insulation.
 - b. Make splices and terminations to conductors #6AWG and larger with corrosion-resistant, high conductivity, pressure indent, hex screw or bolt clamp connectors, with or without tongues, designed specifically for intended service. Connectors for cables 250 kcmil and larger shall have two clamping elements or compression indents. Terminals for bus connections shall have two bolt holes. Splitbolt connectors, Burndy, IlSCO, or Greaves, shall be acceptable for all splices of conductors #6AWG and larger.
2. Insulate splices with a minimum of two layers of all weather, heavy duty, abrasion resistant, 8.5 mil thick, 105 degree C. rated vinyl electrical tape where insulation is required. Tape splices 1 ½ times the thickness of the conductor insulation.
3. Provide high conductivity copper alloy bolt-on lugs with pressure plate and socket set screw or hex head screw to attach wire and cable to disconnect switches, transformers, and other electrical equipment as required.
4. Provide cable reducing adaptor plugs where required for terminating oversize cable to standard size equipment lugs. Conductor strands shall not be cut in order to fit equipment lugs.
5. Provide antioxidant joint compound for all conductor connections.

3.4 OUTLET BOXES:

- A. Provide cast outlet boxes for outdoor work.
- B. Install outlet boxes at uniform heights and straight and true with reference adjacent surface.
- C. Provide knockout plugs in boxes with unused openings.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- D. Secure all outlet boxes with metal straps, rods, or bolts independently of entering conduits or cables.

3.5 PULL BOXES AND JUNCTION BOXES:

- A. Provide pull boxes and junction boxes where shown on the plans and where required to facilitate proper pulling of wires and cables.

3.6 WIRING DEVICES:

- A.. Install receptacles vertically with grounding posts at top of device, except locate grounding post to left for horizontal mounting.

3.7 MOTOR POWER AND CONTROL WIRING:

- A. Contractor shall provide and be responsible for the complete power wiring of all motors and motorized equipment.
- B. Furnish proper overload and short circuit protection for all new motors. Provide a combination thermal overload and disconnect for switch all equipment using fractional horsepower motors.
- C. Check electrical connections and sizing of motor circuit protection and prevent damage to motor and equipment from incorrect direction of rotation.
- D. Provide mounting for motor and equipment disconnect switches adjacent to motor and supported independent of motor.
- E. Provide interlock wiring where required for motors and controllers, whether shown on the drawings or not.

3.8 GROUNDING SYSTEM:

- A. Provide a complete grounding system which will thoroughly ground the non-current carrying metal parts of every piece of installed equipment, as described herein and as indicated on the drawings.
- B. System shall be mechanically and electrically connected to provide an independent return path to the grounding sources.
- C. Each grounding conductor shall have a minimum capacity of 25 percent of the rated capacity of the equipment it grounds, unless otherwise indicated.
- D. The minimum size of grounding conductors shall be No. 12 AWG copper. Insulation color of grounding conductors shall be green.
- E. Provide a separate green ground conductor for each feeder and branch circuit.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

- F. Grounding of Motors: Motors shall be grounded by connecting a green covered conductor from a grounding bushing in the starter to the motor frame. Conductor shall be installed in the conduit with the circuit conductors and terminated in the motor connection box, providing the terminal is mechanically connected to the frame. If this is not feasible, grounding conductor from the starter shall be extended through an insulated bushed opening in the connection box and connected to motor base.
- G. Tests: Entire system shall be thoroughly tested on completion for ground continuity and capacity. Provide not more than 10 ohms resistance between main ground system and equipment frame system neutral and/or derived neutral point.

3.9 SPECIAL REQUIREMENTS:

- A. Wiring shall be bundle tied where passing through pull boxes, wireways, and panelboards in neat and orderly manner with plastic cable ties. Cable ties shall be Ty-Raps as manufactured by Thomas & Betts, or equal.
- B. Turn branch circuits and auxiliary system wiring out of wiring gutters at 90 degrees to circuit breakers and terminal lugs.
- C. Provide miscellaneous hardware and support accessories, including Unistrut, support rods, nuts, bolts, screws, and other such items, with galvanized or cadmium plated finish, or other approved rust inhibiting coatings.
- E. Unload electrical equipment and materials delivered to site. Pay cost for rigging, hoisting, lowering and moving electrical equipment on site, in building or on roof. During construction provide additional protection against moisture, dust accumulation and physical damage of electrical equipment. Provide temporary heaters within units, as approved to evaporate excessive moisture and provide ventilation as required.

3.10 TESTING AND INSPECTION:

- A. Provide personnel and equipment, make required tests, and secure required approvals from the Engineer and governmental agencies having jurisdiction.
- B. When material and/or workmanship is found to not comply with the specified requirements, within three days after receipt of notice of such non-compliance remove thenon-complying items from the job site and replace them with items complying with the specified requirements, all at no additional cost to the Owner.
- C. Perform all required adjustments and settings. Verify and correct deficiencies as necessary including voltages, tap settings, trip settings and phasing of equipment from distribution system to point of use.
- D. Provide all necessary testing equipment.
- E. Test wiring, buswork, and connections for continuity and ground by "megger" test. Minimum insulation resistance between conductors and ground shall be as follows:
 - 1. For circuits of #14 or #12 AWG wire: 1,000,000 ohms.

**SEDGWICK MIDDLE SCHOOL
AIR HANDLING UNITS REPLACEMENT
WEST HARTFORD, CONNECTICUT**

2. Conductor current carrying capacities from 25 to 50 amperes, inclusive: 250,000 ohms.
3. Conductor current carrying capacities from 51 to 100 amperes, inclusive: 100,000 ohms.
4. Conductor current carrying capacities from 101 to 200 amperes, inclusive: 50,000 ohms.
5. Conductor current carrying capacities from 201 to 400 amperes, inclusive: 25,000 ohms.
6. Conductor current carrying capacities from 401 to 800 amperes, inclusive: 12,000 ohms.
7. Conductor current carrying capacities over 800 amperes: 5,000 ohms.

F. In the Owner's Presence:

1. Test all parts of the electrical system and prove that all such items provided under this Section function electrically in the required manner.

3.11 PROJECT COMPLETION:

- A. Upon completion of the work of this Section, thoroughly clean all exposed portions of the electrical installation, removing all traces of soil, labels, grease, oil and other foreign material, and using only the type cleaner recommended by the manufacturer of the item being cleaned.
- B. Vacuum all exteriors and interiors of panelboards, safety switches, and equipment racks to remove all dust, dirt, cable clippings, etc.
- C. Equipment with damage to painted finish shall be repaired to satisfaction of the Owner.
- D. On the first day the facility is in operation, for at least eight hours, at a time directed by the Owner, provide a qualified foreman and crew to perform such electrical work as may be required by the Owner.
- E. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the operations and maintenance manual required to be submitted under these Specifications.

3.14 EQUIPMENT SPECIFIED:

- A. Contractor shall furnish equipment or systems in manufacturers specified or named herein or on the drawings. No other manufacturers shall be considered.

END OF SECTION 26 05 00