

Project Manual and Specifications For

# **Early Equipment Package: Air Handling Units and Electrical Switchgear**

## **Durham Tech Community College Life Sciences Building**

1650 E Lawson St.  
Durham, NC 27703



### **Client:**

Marie-Pierre Lussier  
Project Manager, 35 North  
**Durham Technical Community College**  
1637 East Lawson Street  
Durham, NC 27703  
Telephone: 919.536.7200

### **Architect:**

Architect of Record:  
Andre L. Johnson, AIA, NOMA, NCARB  
**Andre Johnson Architect**  
PO Box 14637  
Raleigh, North Carolina 27620  
Telephone: 919.661.6935

**Andre Johnson Architect Project Number: P2309.00**  
**SCO ID: 23-26245-02B, NCCCS ID: 2731**

### **CONSTRUCTION DOCUMENTS SUBMISSION**

Date of Submission: May 7th, 2025

# PROJECT MANUAL

**Durham Tech Community College  
LIFE SCIENCES BUILDING  
1650 E Lawson Street  
Durham, NC 27703**

SCO ID: 23-26245-02B  
NCCCS ID: 2731

Architect:	Andre Johnson Architects, PLLC 3109 Poplarwood Court, Suite 302 Raleigh, NC 27604 919-616-6935
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Mechanical, Plumbing, Electrical Engineers:	Loring Consulting Engineers 1007 Slater Road Durham, NC 27703 919-355-5521
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Issued:	May 7th, 2025
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April 02, 2025

**DOCUMENT 000107**

**SEALS PAGE**

**1.1 ARCHITECT'S CERTIFICATION**

- A. I, Andre L. Johnson, AIA, hereby specify that the specifications intended to be authenticated by my seal are limited to:

Division 01

and I hereby disclaim any responsibility for all other specifications related to or intended to be used for any part or parts of the Durham Technical Community College Life Sciences Building.



April 02, 2025

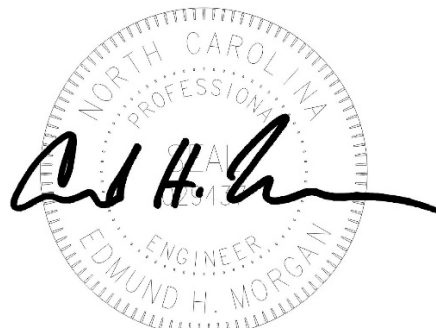
## 1.2 HEATING, VENTILATING, AND AIR CONDITIONING ENGINEER'S CERTIFICATION

- A. I, Edmund H. Morgan, PE, hereby specify that the specifications intended to be authenticated by my seal are limited to:

Division 23:

Section 230500  
Section 230513  
Section 230514  
Section 230548  
Section 233300  
Section 235701  
Section 238100

and I hereby disclaim any responsibility for all other specifications related to or intended to be used for any part or parts of the Durham Technical Community College Life Sciences Building.



4/01/2025



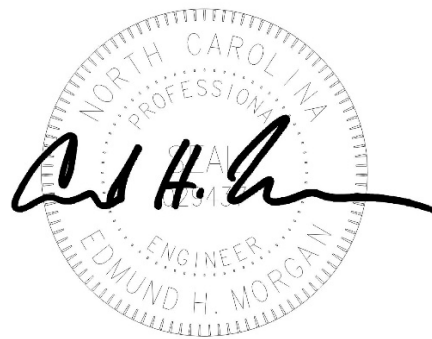
April 02, 2025

### 1.3 ELECTRICAL ENGINEER'S CERTIFICATION

- A. I, Edmund H. Morgan, PE, hereby specify that the specifications intended to be authenticated by my seal are limited to:

Division 26:  
Section 260500  
Section 260502  
Section 262413

and I hereby disclaim any responsibility for all other specifications related to or intended to be used for any part or parts of the Durham Technical Community College Life Sciences Building.



4/01/2025

END OF DOCUMENT



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NOT USED

Durham Technical Community College  
**Life Sciences Building – Early Equipment Package**  
Durham, North Carolina  
Andre Johnson Architect Project No. P2309.00  
SCO ID No.:23-26245-02B  
NCCCS No.: 2731

April 02, 2025

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Durham Technical Community College  
**Life Sciences Building – Early Equipment Package**  
Durham, North Carolina  
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April 02, 2025

## **DOCUMENT 001113 - ADVERTISEMENT FOR BIDS**

### **1.1 NEWSPAPER ADVERTISEMENT**

- A. The Advertisement for Bids published in newspaper(s) is bound hereinafter.

**END OF DOCUMENT**



## ADVERTISEMENT FOR BIDS

Sealed proposals will be received until \_\_\_\_\_  
(Time)

on \_\_\_\_\_, in office of Susan Bowen, Ed. D at  
1637 E. Lawson St, Durham, NC 27704, for the construction of

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Life Sciences Building  
Durham Tech Community College  
1637 E. Lawson St., Durham, NC 27703

at which time and place bids will be opened and read.

Complete plans and specifications for this project can be  
obtained from Andre Johnson Architects, PLLC  
during normal office hours after \_\_\_\_\_ (Date)

Plan Deposit \_\_\_\_\_

The state reserves the unqualified right to reject any and all  
proposals.

Signed: \_\_\_\_\_  
(Owner)  
\_\_\_\_\_  
\_\_\_\_\_



Durham Technical Community College  
**Life Sciences Building – Early Equipment Package**  
Durham, North Carolina  
Andre Johnson Architect Project No. P2309.00  
SCO ID No.:23-26245-02B  
NCCCS No.: 2731

April 02, 2025

## **DOCUMENT 001116 – NOTICE TO BIDDERS**

### **1.1 NOTICE TO BIDDERS**

- A. The Notice to Bidders is bound hereinafter.

**END OF DOCUMENT**





# NOTICE TO BIDDERS

Sealed proposals will be received by the Trustees of Durham Tech Community College in Durham, NC, in the office of Susan Bowen, Ed. D at 1637 E. Lawson St, Durham, NC 27704, Room (bid opening location/room #) \_\_\_\_\_ up to 3:00 pm (Date), 2025\_\_\_\_ and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment entering into the construction of

Life Sciences Building  
Durham Tech Community College  
1650 E Lawson St  
Durham, NC 27703

-----*(Brief Description of Scope)*-----

Bids will be received for Contract type –(single prime )- (separate prime) - (dual bidding\*) – and if separate prime use only: (General, Plumbing, Mechanical and Electrical) . All proposals shall be lump sum.

*\*Note: Dual bidding requires separate prime bids be received, but not opened, (1) one hour prior to receiving single prime bids. Upon receipt of single prime bids, all bids will be opened and read. See SBC Guidelines for opening.*

## Pre-Bid Meeting

An open pre-bid meeting will be held for all interested bidders on (Date --- Time --- Public Location). The meeting will address project specific questions, issues, bidding procedures and bid forms. (Include any other information as necessary to facilitate bidders understanding of the work. Complete plans, specifications and contract documents will be open for inspection in the offices of Durham Tech Community College and Andre Johnson Architects, PLLC and in the plan rooms of the Associated General Contractors, Carolinas Branch, Charlotte, NC and in the local North Carolina offices of McGraw-Hill Dodge Corporation, and in the Eastern Regional Office of Reed Construction Data in Norcross, GA and in Minority Plan Rooms in ----(Edit list below)-----

Designers should verify minority plan room information prior to issuing documents.

Hispanic Contractors Association of the Carolinas (HCAC) in Winston-Salem, Charlotte and Raleigh Areas – 877-227-1680

NCIMED Plan & Resource Center, 114 West Parrish Street, 6<sup>th</sup> Floor, Durham, NC 27701, 919-956-8889 or 919-287-3036

or may be obtained by those qualified as prime bidders, upon deposit of \_\_\_\_\_ dollars (\$\_\_\_\_\_) in cash or certified check. The full plan deposit will be returned to those bidders provided all documents are returned in good, usable condition within ten (10) days after the bid date.

If a contractor is bidding under the dual system both as a single prime contractor and as a separate prime contractor, he must submit the bids on separate forms and in separate envelopes. Bidders should clearly indicate on the outside of the bid envelope which contract(s) they are bidding.

**NOTE:** The bidder shall include with the bid proposal the form *Identification of Minority Business Participation* identifying the minority business participation it will use on the project and shall include either *Affidavit A* or *Affidavit B* as applicable. Forms and instructions are included within the Proposal Form in the bid documents. Failure to complete these forms is grounds for rejection of the bid. (GS143-128.2c Effective 1/1/2002.)

All contractors are hereby notified that they must have proper license as required under the state laws governing their respective trades.

General contractors are notified that Chapter 87, Article 1, General Statutes of North Carolina, will be observed in receiving and awarding general contracts. General contractors submitting bids on this project must have license classification for \_\_\_\_\_  
(*set forth the license classification required by the NC General Contractors Licensing Board under G.S. 87-1*)

**NOTE--SINGLE PRIME CONTRACTS:** Under GS 87-1, a contractor that superintends or manages construction of any building, highway, public utility, grading, structure or improvement shall be deemed a "general contractor" and shall be so licensed. Therefore a single prime project that involves other trades will require the single prime contractor to hold a proper General Contractors license. **EXCEPT:** On public buildings being bid single prime, where the total value of the general construction does not exceed 25% of the total construction value, contractors under GS87- Arts 2 and 4 (Plumbing, Mechanical & Electrical) may bid and contract directly with the Owner as the SINGLE PRIME CONTRACTOR and may subcontract to other properly licensed trades. [GS87-1.1- Rules .0210](#)

Each proposal shall be accompanied by a cash deposit or a certified check drawn on some bank or trust company, insured by the Federal Deposit Insurance Corporation, of an amount equal to not less than five percent (5%) of the proposal, or in lieu thereof a bidder may offer a bid bond of five percent (5%) of the bid executed by a surety company licensed under the laws of North Carolina to execute the contract in accordance with the bid bond. Said deposit shall be retained by the owner as liquidated damages in event of failure of the successful bidder to execute the contract within ten days after the award or to give satisfactory surety as required by law.

A performance bond and a payment bond will be required for one hundred percent (100%) of the contract price.

Payment will be made based on ninety-five percent (95%) of monthly estimates and final payment made upon completion and acceptance of work.

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of 30 days.

The owner reserves the right to reject any or all bids and to waive informalities.

Designer:  
Andre Johnson Architects, PLLC \_\_\_\_\_  
(*Name*)

P.O. Box 14637, Raleigh, NC 27620 \_\_\_\_\_  
(*Address*)

919-661-6935 \_\_\_\_\_  
(*Phone*)

Owner:  
Durham Tech Community College \_\_\_\_\_  
(*Agency/Institution*)

\_\_\_\_\_

\_\_\_\_\_

**DOCUMENT 002119**

**GENERAL CONDITIONS OF THE CONTRACT**

**1.1 APPLICABLE DOCUMENTS**

- A. Form OC-15M "General Conditions of the Contract Standard Form for Construction Manager-At-Risk Projects" developed by the North Carolina Department of Administration State Construction Office are part of the Contract Documents and are bound herein.

**END OF DOCUMENT**



**GENERAL CONDITIONS OF THE CONTRACT**

**STANDARD FORM FOR CONSTRUCTION MANAGER-AT-RISK PROJECTS**

**NORTH CAROLINA**

**DEPARTMENT OF ADMINISTRATION**

**STATE CONSTRUCTION OFFICE**

**Form OC-15CM**

**This document is intended for use on State capital construction projects and shall not be used on any project that is not reviewed and approved by the State Construction Office. Extensive modification to the General Conditions by means of “Supplementary General Conditions” is strongly discouraged. State agencies and institutions may include special requirements in “Division 1 – General Requirements” of the specifications, where they do not conflict with the General Conditions.**

**Second Edition January 2013**

**Revision 1 – May 2024: Article 23.b**

## GENERAL CONDITIONS OF THE CONTRACT

The use or reproduction of this document or any part thereof is authorized for and limited to use on projects of the State of North Carolina, and is distributed by, through and at the discretion of the State Construction Office, Raleigh, North Carolina, for that distinct and sole purpose.

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## ARTICLE 1 - DEFINITIONS

- a. The **contract documents** consist of the Request for Proposal (RFP); Construction Manager's formal response to the RFP; General Conditions of the Contract; special conditions if applicable; Supplementary General Conditions; the drawing and specifications, including all bulletins, addenda or other modifications of the drawings and specifications incorporated into the documents prior to their execution; the contract; the performance bond; the payment bond; insurance certificates; the approval of the attorney general; and the certificate of the Office of State Budget and Management. All of these items together form the contract.
- b. The **Owner** is the State of North Carolina by and through the agency or institution named in the contract..
- c. The **designer** or **project designer** means the firm or firms of architects or engineers or both (and their consultants) which have undertaken to design the project pursuant to a contract with the Owner, (hereinafter, the "design contract").
- d. The **Construction Manager-at-Risk (CM)** **accepts a relationship of trust and confidence between himself and the Owner and undertakes to act as the Owner's fiduciary in the handling and opening of bids in accordance with the provisions of North Carolina General Statute (N.C.G.S.) 143-128.1.** The CM agrees to furnish his best skills and his best judgment to cooperate with the Owner and Designer for undertaking all necessary action contemplated under the contract documents to (a) establish during the design phase a Guaranteed Maximum Price (GMP) to construct the project and (b) ensure timely and quality completion of the project at a cost within the GMP. Construction Manager or CM as used in the contract documents means Construction Manager-at-Risk (CM at Risk).
- e. A **subcontractor**, as the term is used herein, shall be in the case of a principal trade contractor, a general, mechanical, electrical or plumbing contractor or in the case of a specialty contractor, a trade contractor who is not a principal trade contractor, who has entered into a direct contract with a CM, and includes one who furnishes materials worked to a special design in accordance with plans and specifications covered by the contract, but does not include one who only sells or furnishes materials not requiring work so described or detailed.
- f. **Written notice** shall be defined as notice in writing delivered in person to the contractor, or to a partner of the firm in the case of a partnership, or to a member of the contracting organization, or to an officer of the organization in the case of a corporation, or sent to the last known business address of the contracting organization by registered mail.
- g. **Work**, as used herein as a noun, is intended to include materials, labor, and workmanship of the appropriate contractor as supervised by the CM.
- h. The **project** is the total construction work to be performed under the contract documents.
- i. **Construction Management Fee** shall be an all inclusive lump sum management fee which will include all Construction Manager-at-Risk home office, project site and project related costs including all Construction Manager-at-Risk overhead costs and profit.
- j. **Change order**, as used herein, shall mean a written order to the CM subsequent to the signing of the contract authorizing a change in the GMP contract. The change order shall be signed by the CM, designer and the Owner, and approved by the State Construction Office, in that order (Article 19).

- k. **Field Order**, as used herein, shall mean a written approval for the CM to proceed with the work requested by Owner prior to issuance of a formal Change Order. The field order shall be signed by the CM, designer, Owner, and State Construction Office (SCO).
- l. **Field Change**, as used herein shall mean a written approval from the Owner for the CM to proceed with work requested by the Owner to be paid for from the CM Contingency or Owner's Project Reserve within the GMP.
- m. **Time of Completion**, as stated in the contract documents, is to be interpreted as consecutive calendar days measured from the date established in the written Notice to Proceed, or such other date as may be established herein (Article 23).
- n. **Liquidated damages**, as stated in the contract documents, is an amount reasonably estimated in advance to cover the consequential damages associated with the Owner's economic loss in not being able to use the Project for its intended purposes at the end of the contract's completion date as amended by change order, if any, by reason of failure of the CM to complete the work within the time specified. Liquidated damages does not include the Owner's extended contract administration costs (including but not limited to additional fees for architectural and engineering services, testing services, inspection services, commissioning services, etc.), such other damages directly resulting from delays caused solely by the CM, or consequential damages that the Owner identified in the bid documents that may be impacted by any delay caused solely by the CM (e.g., if a multi-phased project-subsequent phases, delays in start of other projects that are dependent on the completion of this Project, extension of leases and/or maintenance agreements for other facilities).
- o. **Surety**, as used herein, shall mean the bonding company or corporate body which is bound with and for the CM, and which engages to be responsible for the CM and his acceptable performance of the work.
- p. **Routine written communications between the Designer and the Construction Manager** are any communication other than a "request for information" provided in letter, memo, or transmittal format, sent by mail, courier, electronic mail, or facsimile. Such communications cannot be identified as "request for information".
- q. **Clarification or Request for information (RFI)** is a request from the CM seeking an interpretation or clarification by the Designer relative to the contract documents. The RFI, which shall be labeled (RFI), shall clearly and concisely set forth the issue or item requiring clarification or interpretation and why the response is needed. The RFI must set forth the CM's interpretation or understanding of the contract documents requirements in question, along with reasons for such an understanding.
- r. **Approval** means written or imprinted acknowledgement that materials, equipment or methods of construction are acceptable for use in the work.
- s. **Inspection** shall mean examination or observation of work completed or in progress to determine its compliance with contract documents.
- t. **"Equal to" or "approved equal"** shall mean materials, products, equipment, assemblies, or installation methods considered equal by the bidder in all characteristics (physical, functional, and aesthetic) to those specified in the contract documents. Acceptance of equal is subject to approval of the designer and owner.

- u. **“Substitution” or “substitute”** shall mean materials, products, equipment, assemblies, or installation methods deviating in at least one characteristic (physical, functional, or aesthetic) from those specified, but which in the opinion of the bidder would improve competition and/or enhance the finished installation. Acceptance of substitution is subject to the approval of the designer and owner.
- v. **Provide** shall mean furnish and install complete in place, new, clean, operational, and ready for use.
- w. **Indicated and shown** shall mean provide as detailed, or called for, and reasonably implied in the contract documents.
- x. **Special inspector** is one who inspects materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with the approved construction documents and referenced standards.
- y. **Commissioning** is a quality assurance process that verifies and documents that building components and systems operate in accordance to the owner’s project requirements and the project design documents.
- z. **Designer Final Inspection** is the inspection performed by the design team to determine the completeness of the project in accordance with approved plans and specifications. This inspection occurs prior to SCO final inspection.
- aa. **SCO Final Inspection** is the inspection performed by the State Construction Office to determine the completeness of the project in accordance with NC Building Codes and approved plans and specifications.
- bb. **Beneficial Occupancy** is requested by the owner and is occupancy or partial occupancy of the building after all life safety items have been completed as determined by the State Construction Office. Life safety items include but not limited to fire alarm, sprinkler, egress and exit lighting, fire rated walls, egress paths and security.
- cc. **Final Acceptance** is the date in which the State Construction Office accepts the construction as totally complete. This includes the SCO Final Inspection and certification by the designer that all punch lists are completed.

## ARTICLE 2 - INTENT AND EXECUTION OF DOCUMENTS

- a. The drawings and specifications are complementary, one to the other. That which is shown on the drawings or called for in the specifications shall be as binding as if it were both called for and shown. The intent of the drawings and specifications is to establish the scope of all labor, materials, transportation, equipment, and any and all other things necessary to provide a complete job. In case of discrepancy or disagreement in the contract documents, the order of precedence shall be: Form of Contract, specifications, large-scale detail drawings, small-scale drawings.
- b. The wording of the specifications shall be interpreted in accordance with common usage of the language except that words having a commonly used technical or trade meaning shall be so interpreted in preference to other meanings.

- c. The CM shall execute each copy of the response to RFP, contract, performance bond and payment bond as follows:
  1. If the documents are executed by a sole Owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person executing them.
  2. If the documents are executed by a partnership, that fact shall be evidenced by the word "Co-Partner" appearing after the name of the partner executing them.
  3. If the documents are executed on the part of a corporation, they shall be executed by either the president or the vice president and attested by the secretary or assistant secretary in either case, and the title of the office of such persons shall appear after their signatures. The seal of the corporation shall be impressed on each signature page of the documents.
  4. If the documents are made by a joint venture, they shall be executed by each member of the joint venture in the above form for sole Owner, partnership or corporation, whichever form is applicable to each particular member.
  5. All signatures shall be properly witnessed.
  6. If the construction manager's license is held by a person other than an Owner, partner or officer of a firm, then the licensee shall also sign and be a party to the contract. The title "Licensee" shall appear under his/her signature.
  7. The bonds shall be executed by an attorney-in-fact. There shall be attached to each copy of the bond a certified copy of power of attorney properly executed and dated.
  8. Each copy of the bonds shall be countersigned by an authorized individual agent of the bonding company licensed to do business in North Carolina. The title "Licensed Resident Agent" shall appear after the signature.
  9. The seal of the bonding company shall be impressed on each signature page of the bonds.
  10. The CM's signature on the performance bond and the payment bond shall correspond with that on the contract.

### **ARTICLE 3 - CLARIFICATIONS AND DETAIL DRAWINGS**

- a. In such cases where the nature of the work requires clarification by the designer, such clarification shall be furnished by the designer with reasonable promptness by means of written instructions or detail drawings, or both. Clarifications and drawings shall be consistent with the intent of contract documents, and shall become a part thereof.
- b. The CM and the Designer shall prepare, if deemed necessary, a schedule fixing dates upon which foreseeable clarifications will be required. The schedule will be subject to addition or change in accordance with progress of the work. The Designer shall furnish drawings or clarifications in accordance with that schedule. The CM shall not proceed with the work without such detail drawings and/or written clarifications.

### **ARTICLE 4 - COPIES OF DRAWINGS AND SPECIFICATIONS**

The Designer or owner shall furnish free of charge to the CM electronic copies of plans and specifications. If requested by the CM, up to 30 paper copies of plans and specifications will be

provide free of charge,, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the CM shall clearly and legibly record all work-in-place that is at variance with the contract documents. Additional sets shall be furnished at cost, including mailing, to the CM at the request of the CM.

#### **ARTICLE 5 - SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA**

- a. Within fifteen (15) consecutive calendar days of the notice to proceed, a schedule for anticipated submission of all shop drawings, product data, samples, and similar submittals shall be prepared by the CM and provided to the designer. This schedule shall indicate the items, relevant specification sections, other related submittal data, and the date when these items will be furnished to the designer.
- b. The CM shall review, approve and submit to the Designer all Shop Drawings, Coordination Drawings, Product Data, Samples, Color Charts, and similar submittal data required or reasonably implied by the Contract Documents. Required Submittals shall bear the CM's stamp of approval, any exceptions to the Contract Documents shall be noted on the submittals, and copies of all submittals shall be of sufficient quantity for the Designer to retain up to three (3) copies of each submittal for his own use plus additional copies as may be required by the CM. Submittals shall be presented to the Designer in accordance with the schedule submitted in paragraph (a). so as to cause no delay in the activities of the Owner.
- c. The Designer shall review required submittals promptly, noting desired corrections if any, and retaining three (3) copies (1 for the Designer, 1 for the owner and 1 for SCO) for his use. The remaining copies of each submittal shall be returned to the CM not later than twenty (20) days from the date of receipt by the Designer, for the CM's use or for corrections and resubmittal as noted by the Designer. When resubmittals are required, the submittal procedure shall be the same as for the original submittals.
- d. Approval of shop drawings by the designer shall not be construed as relieving the CM from responsibility for compliance with the design or terms of the contract documents nor from responsibility of errors of any sort in the shop drawings, unless such error has been called to the attention of the designer in writing by the CM.

#### **ARTICLE 6 - WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE**

- a. The CM shall maintain, in readable condition at his job office, one complete set of working drawings and specifications for his work including all shop drawings. Such drawings and specifications shall be available for use by the Designer or his authorized representative, owner or State Construction Office.
- b. The CM shall maintain at the job office, a day-to-day record of work-in-place that is at variance with the contract documents. Such variations shall be fully noted on project drawings by the CM and submitted to the designer upon project completion and no later than thirty (30) days after acceptance of the project.
- c. The contractor shall maintain at the job office a record of all required tests that have been performed, clearly indicating the scope of work inspected and the date of approval or rejection.



## **ARTICLE 7 - OWNERSHIP OF DRAWINGS AND SPECIFICATIONS**

All drawings and specifications are instruments of service and remain the property of the Owner. The use of these instruments on work other than this contract without permission of the Owner is prohibited. All copies of drawings and specifications other than contract copies shall be returned to the Owner upon request after completion of the work.

## **ARTICLE 8 - MATERIALS, EQUIPMENT, EMPLOYEES**

- a. The CM shall, unless otherwise specified, supply & pay for all lighting, power, heat, sanitary facilities & water and shall require the Principal Trade and Specialty Contractors to, supply and pay for all labor, transportation, materials, tools, apparatus, scaffolding and incidentals necessary for the completion of his work, and to install, maintain and remove all equipment of the construction, other utensils or things, and be responsible for the safe, proper and lawful construction, maintenance and use of same. The CM shall construct in the best and most workmanlike manner, a complete job and everything incidental thereto, as shown on the plans, stated in the specifications, or reasonably implied there from, all in accordance with the contract documents.
- b. All materials shall be new and of quality specified, except where reclaimed material is authorized herein and approved for use. Workmanship shall at all times be of a grade accepted as the best practice of the particular trade involved, and as stipulated in written standards of recognized organizations or institutes of the respective trades except as exceeded or qualified by the specifications.
- c. Upon notice, the CM shall furnish evidence from the the Principal Trade and Specialty Contractors as to quality of materials.
- d. Products are generally specified by ASTM or other reference standard and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the CM through the Principal Trade or Specialty Contractor may select any product meeting this standard, by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the CM through the Principal Trade or Specialty Contractor has the option of using any product and manufacturer combination listed. However, the CM through the Principal Trade or Specialty Contractor shall be aware that the cited examples are used only to denote the quality standard of product desired and that they do not restrict bidders to a specific brand, make, manufacturer or specific name; that they are used only to set forth and convey to bidders the general style, type, character and quality of product desired; and that equivalent products will be acceptable. The CM shall be responsible for reviewing all substitution requests from Principal Trade or Specialty Contractors prior to submission to the Project Designer and Owner and shall track & monitor all such requests. Requests for substitution of materials, items, or equipment shall be submitted to the Project Designer for approval or disapproval; such approval or disapproval shall be made by the designer prior to the opening of bids. Alternate materials may be requested after award if it can clearly be demonstrated that it is an added benefit to the owner and the designer and the owner approves.
- e. The CM shall obtain written approval from the designer for the use of products, materials, equipment, assemblies or installation methods claimed as equal to those specified. Such approvals must be obtained as soon after contract awards as possible and before any materials are ordered.

- f. The Designer is the judge of equality for proposed substitution of products, materials or equipment.
- g. If at any time during the construction and completion of the work covered by these contract documents, the conduct of any workman of the various crafts be adjudged a nuisance to the Owner or Designer, or if any workman be considered detrimental to the work, the CM shall order such parties removed immediately from grounds.

## **ARTICLE 9 - ROYALTIES, LICENSES AND PATENTS**

It is the intention of the contract documents that the work covered herein will not constitute in any way infringement of any patent whatsoever unless the fact of such patent is clearly evidenced herein. The CM shall protect and save harmless the Owner against suit on account of alleged or actual infringement. The CM shall pay all royalties and/or license fees required on account of patented articles or processes, whether the patent rights are evidenced hereinafter.

## **ARTICLE 10 - PERMITS, INSPECTIONS, FEES, REGULATIONS**

- a. The CM shall give all notices and comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the work under this contract. If the CM observes that the drawings and specifications are at variance therewith, he shall promptly notify the Designer in writing. Any necessary changes required after contract award shall be made by change order in accordance with Article 19. If the CM performs any work or authorizes any work to be performed knowing it to be contrary to such laws, ordinances, codes, rules and regulations, and without such notice to the designer, he shall bear all cost arising there from. Additional requirements implemented after bidding will be subject to equitable negotiations.
- b. All work under this contract shall conform to the North Carolina State Building Code and other State, local and national codes as are applicable. The cost of all required inspections and permits shall be the responsibility of the CM unless otherwise specified.
- c. Projects constructed by the State of North Carolina or by any agency or institution of the State are not subject to inspection by any county or municipal authorities and are not subject to county or municipal building codes. The CM shall, however, cooperate with the county or municipal authorities by obtaining building permits. Permits shall be obtained at no cost.
- d. Projects involving local funding (Community Colleges) are also subject to county and municipal building codes and inspection by local authorities. The CM shall pay the cost of these permits and inspections unless otherwise specified.

## **ARTICLE 11 - PROTECTION OF WORK, PROPERTY AND THE PUBLIC**

- a. The CM shall be responsible for the entire site and the building or construction of the same and provide all the necessary protections, as required by the Owner or designer, and by laws or ordinances governing such conditions. The CM shall be responsible for any damage to the Owner's property or of that of others on the job, by them, their personnel, or their subcontractors, and shall make good such damages. The CM shall be responsible for and pay for any damages caused to the Owner. The CM shall have access to the project at all times.

- b. The CM shall be responsible to cover and protect all portions of the structure when the work is not in progress, provide and set all temporary roofs, covers for doorways, sash and windows, and all other materials necessary to protect all the work on the building. Any work damaged through the lack of proper protection or from any other cause, shall be repaired or replaced without extra cost to the Owner.
- c. No fires of any kind will be allowed inside or around the operations during the course of construction without special permission from the Designer.
- d. The CM shall ensure that all trees and shrubs designated to remain in the vicinity of the construction operations are protected in accordance with the requirements of the plans and specifications. All walks, roads, etc., shall be barricaded as directed by the designer to keep the public away from the construction. All trenches, excavations or other hazards in the vicinity of the work shall be well barricaded and properly lighted at night.
- e. The CM shall develop and implement a project safety plan that provides all necessary safety measures for the protection of all persons on the job, including the requirements of the A.G.C. *Accident Prevention Manual in Construction*, as amended, and shall fully comply with all state laws or regulations and North Carolina State Building Code requirements to prevent accident or injury to persons on or about the location of the work. The CM shall clearly mark or post signs warning of hazards existing, and shall barricade excavations, elevator shafts, stairwells and similar hazards. The CM shall insure that protection is provided against damage or injury resulting from falling materials and that all protective devices and signs be maintained throughout the progress of the work.
- f. The CM shall adhere to the rules, regulations and interpretations of the North Carolina Department of Labor relating to Occupational Safety and Health Standards for the Construction Industry (Title 29, Code of Federal Regulations, Part 1926, published in Volume 39, Number 122, Part II, June 24, 1974, *Federal Register*), and revisions thereto as adopted by N.C.G.S. 95-126 through 155.
- g. The CM shall designate a responsible person of his organization as safety officer/inspector to inspect the project site for unsafe health and safety hazards, to report these hazards to the contractor for correction, and whose duties also include accident prevention on the project, and to provide other safety and health measures on the project site as required by the terms and conditions of the contract. The name of the safety inspector shall be made known to the designer and owner at the time of the preconstruction conference and in all cases prior to any work starting on the project.
- h. In the event of an emergency affecting the safety of life, the protection of work, or the safety of adjoining properties, the CM is hereby authorized to act at his own discretion, without further authorization from anyone, to prevent such threatened injury or damage. Any compensation claimed by the CM on account of such action shall be determined as provided for under Article 19(b).
- i. Any and all costs associated with correcting damage caused to adjacent properties of the construction site or staging area shall be borne by the contractor. These costs shall include but not be limited to flooding, mud, sand, stone, debris, and discharging of waste products.

## **ARTICLE 12 - SEDIMENTATION POLLUTION CONTROL ACT OF 1973**

- a. Any land-disturbing activity performed by the CM or any Principal Trade or Specialty Contractor in connection with the project shall comply with all erosion control measures set

forth in the contract documents and any additional measures which may be required in order to ensure that the project is in full compliance with the Sedimentation Pollution Control Act of 1973, as implemented by Title 15, North Carolina Administrative Code, Chapter 4, Sedimentation Control, Subchapters 4A, 4B and 4C, as amended (15 N.C.A.C. 4A, 4B and 4C).

- b. Upon receipt of notice that a land-disturbing activity is in violation of said act, the CM shall be responsible for ensuring that all steps or actions necessary to bring the project in compliance with said act are promptly taken.
- c. The CM shall be responsible for defending any legal actions instituted pursuant to N.C.G.S. 113A-64 against any party or persons described in this article.
- d. To the fullest extent permitted by law, the CM shall indemnify and hold harmless the Owner, the designer and the agents, consultants and employees of the Owner and designer, from and against all claims, damages, civil penalties, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance of work or failure of performance of work, provided that any such claim, damage, civil penalty, loss or expense is attributable to a violation of the Sedimentation Pollution Control Act. Such obligation shall not be construed to negate, abridge or otherwise reduced any other right or obligation of indemnity which would otherwise exist as to any party or persons described in this article.

#### **ARTICLE 13 - INSPECTION OF THE WORK**

- a. It is a condition of this contract that the work shall be subject to inspection during normal working hours by the designer, designated official representatives of the Owner, State Construction Office and those persons required by state law to test special work for official approval. The CM shall therefore provide safe access to the work at all times for such inspections.
- b. All instructions to the CM will be made only by or through the designer or his designated project representative. Observations made by official representatives of the Owner shall be conveyed to the designer for review and coordination prior to issuance to the CM.
- c. The CM shall perform quality control inspections on the work of Principal Trade and Specialty Contractors to guard the Owner against defects and deficiencies in the work and shall coordinate this activity with the on-site duties of the Project Designer. The CM shall advise the Project Designer of any apparent variation and/or deviation from the intent of the Contract Documents and shall take the necessary action to correct such variations and deviations.
- d. All work shall be inspected by designer, special inspector and/or State Construction Office prior to being covered by the contractor. The CM shall give a minimum two weeks notice unless otherwise agreed to by all parties. If inspection fails, after the first re-inspection all costs associated with additional re-inspections shall be borne by the CM.
- e. Where special inspection or testing is required by virtue of any state laws, instructions of the designer, specifications or codes, the CM shall give adequate notice to the Project Designer of the time set for such inspection or test, if the inspection or test will be conducted by a party other than the Project Designer. Such special tests or inspections will be made in the presence of the Project Designer, or his authorized representative, and it shall be the CM's responsibility to serve ample notice of such tests.

- f. All laboratory tests shall be paid by the Owner unless provided otherwise in the contract documents except the CM shall pay for laboratory tests to establish design mix for concrete and for additional tests to prove compliance with contract documents where materials have tested deficient except when the testing laboratory did not follow the appropriate ASTM testing procedures.
- g. Should any work be covered up or concealed prior to inspection and approval by the Project Designer and/or (SCO) such work shall be uncovered or exposed for inspection, if so requested by the Project Designer or SCO in writing. Inspection of the work will be made promptly upon notice from the CM. All cost involved in uncovering, repairing, replacing, recovering and restoring to design condition, the work that has been covered or concealed will be paid by the CM.

#### **ARTICLE 14 - CONSTRUCTION SUPERVISION AND SCHEDULE**

- a. On-site representatives of the CM shall manage the work of the Principal Trade and Specialty Contractors and coordinate the work with the activities of the Owner and Project Designer to complete the project with the Owner's objectives of cost, time and quality. Throughout the progress of the work, the CM shall maintain a competent and adequate full-time staff approved by the Owner and Project Designer. It is understood that the designated and approved on-site representative of the CM will remain on the job and in responsible charge as long as those persons remain employed by the CM unless otherwise requested or agreed to by the Owner. The CM shall establish an on-site organization with appropriate lines of authority to act on behalf of the CM. Instructions, directions or notices given to the designated on-site authority shall be as binding as if given to the CM. However, directions, instructions, and notices shall be confirmed in writing.
- b. The CM shall examine and study the drawings and specifications and fully understand the project design, and shall provide constant and efficient supervision to the work. Should he discover any discrepancies of any sort in the drawings or specifications, he shall report them to the designer without delay. He will not be held responsible for discrepancies in the drawings and/or specifications, but shall be held responsible to report them should they become known to him.
- c. The CM shall call and preside over monthly job site progress conferences. All Principal Trade and Specialty Contractors shall be represented at these job progress conferences by both home office and project personnel. The CM shall require attendance from other subcontractors and material suppliers who can contribute toward maintaining required job progress. It shall be the principal purpose of these meetings, or conferences, to effect coordination, cooperation and assistance in every practical way toward the end of maintaining progress of the project on schedule and to complete the project within the specified contract time. The CM shall be prepared to assess progress of the work and to recommend remedial measures for correction of progress as may be appropriate. The CM with assistance from the Designer shall be the coordinator of the conferences and shall preside as chairman. The CM shall turn over a copy of his daily reports to the Designer and Owner at the job site progress conference. Owner will determine daily report format.
- d. The CM shall employ an engineer or a land surveyor licensed in the State of North Carolina to lay out the work and to establish a bench mark nearby in a location where same will not be disturbed and where direct instruments sights may be taken.

- e. Prior to bidding, it shall be the responsibility of the CM to prepare an electronic and paper copy of a preliminary critical path method (CPM) schedule and submit such schedule to the Project Designer for his review and comment in sufficient time to allow revisions prior to inserting said schedule into the Principal Trade and Specialty Contractors' bid packages. After contract award but prior to thirty (30) days from the date of the notice to proceed, the CM shall obtain from the Principal Trade and Specialty Contractors their respective work activities and integrate them into a project construction schedule in CPM form. The resulting CPM schedule shall show all salient features of the work required for construction of the project from start to finish within the time allotted by the contract. The time in days between the CM's early completion date and the contractual completion date is project float time and shall be used as such by the CM unless amended by change order. The CM shall submit to the Project Designer an electronic and paper copy of the final CPM schedule after contracts are executed but within fifteen (15) days prior to the written notice to proceed. The Project Designer after reviewing and commenting on the project CPM schedule shall submit it to the Owner for approval. No application for payment will be processed until the project CPM schedule is approved by the Owner. No monthly application for payment will be processed without the submission of an electronic and paper copy of the CPM schedule attached.
- f. The CPM schedule shall be a complete computer generated network analysis showing the complete sequence of construction activities, identifying the work of separate stages and other logically grouped activities, indicating early and late start and early and late finish dates, float duration and a complete logic. Monthly updates will show the estimated completion of each activity.
- g. The CM shall distribute to the principal trade and specialty contractors the approved project CPM schedule and shall display same at the job site.
- h. The CM shall maintain the project CPM schedule, making monthly adjustments, updates, corrections, etc., which are necessary to finish the project within the time allotted by the contract. In doing so, the CM shall keep the designer as well as all Principal Trade and Specialty Contractors fully informed as to all changes and updates to the schedule. The CM shall submit to the Project Designer a monthly report of the status of all work activities. The monthly status report shall show the actual work completed to date in comparison with the original amount of work scheduled. If the work is behind schedule, the CM must indicate in writing what measures are being taken to bring the work back on schedule and ensure that the contract completion date is not exceeded. If the work is greater than thirty (30) days behind schedule and no legitimate requests for time extensions are in process, then the CM shall prepare and submit to the Project Designer a recovery schedule for review and approval. Failure of the CM to abide by the directives in this paragraph will give the Owner cause to exercise the remedies set forth in Article 29 of the General Conditions and pursue any other legal remedies allowed it by law.

#### **ARTICLE 15 – {NOT USED}**

#### **ARTICLE 16 - PRINCIPAL TRADE AND SPECIALTY CONTRACTS AND CONTRACTORS**

- a. Principal Trade and Specialty Contractors shall be pre-qualified by the CM. The prequalification criteria shall be determined by the Owner and CM to address quality, performance, the time specified in the bids for performance of the contract, the cost of construction oversight, time for completion, capacity to perform, and any other factors deemed appropriate by the Owner and/or CM. Basic qualification information from Principal Trade and Specialty Contractors shall be requested on the standard State of North Carolina

Prequalification Form approved by the State Building Commission. Only pre-qualified contractors are allowed to bid to and contract with the CM on a project.

- b. All bids for Principal Trade and Specialty Contracts shall be publically advertised and shall be opened publically in a public venue, and once opened, shall be public records under N.C.G.S. 132. The CM shall award the contract to the lowest responsible, responsive bidder, taking into consideration quality, performance, the time specified in the bids for performance of the contract, the time for completion, compliance with N.C.G.S. 143-128.2, and other factors deemed appropriate by the Owner and advertised as part of the bid solicitation. When contracts are awarded pursuant to this section, the Owner shall provide for a dispute resolution procedure as provided by N.C.G.S. 143-128(f1). Once Principal Trade and Specialty Contractors are in place, the CM shall provide copies of the contracts to the Project Designer and also provide a list of equipment and material suppliers.
- c. A CM may perform a portion of the work only if (a) bidding produces no responsible, responsive bidder for that portion of the work, or (b) the lowest responsible, responsive bidder will not execute a contract for the bid portion of the work, or the Principal Trade or Specialty Contractor defaults and a prequalified replacement cannot be obtained in a timely manner, and (c) the Owner approves performance of the work by the CM.
- d. The Designer will furnish to any Principal Trade or Specialty Contractor, upon request, evidence regarding amounts of money paid to the CM on account of the work of the Principal Trade or Specialty Contractor.
- e. The CM is and remains fully responsible for his own acts or omissions as well as those of any Principal Trade or Specialty Contractor or of any employee of either. The CM agrees that no contractual relationship exists between the Principal Trade and Specialty Contractors and the Owner in regard to the contract, and that the Principal Trade and Specialty Contractors act on this work as an agent or employee of the CM.

## **ARTICLE 17 - CONSTRUCTION MANAGER AND SUBCONTRACTOR RELATIONSHIPS**

The CM agrees that the terms of these contract documents shall apply equally to each Principal Trade and Specialty Contractor as to the CM, and the CM agrees to take such action as may be necessary to bind each Principal Trade and Specialty Contractor to these terms. The CM further agrees to conform to the Code of Ethical Conduct as adopted by the Associated General Contractors of America, Inc., with respect to CM-subcontractor relationships, and that payments to Principal Trade and Specialty Contractors shall be made in accordance with the provisions of N.C.G.S. 143-134.1 titled "Interest on final payments due to prime contractors: payments to subcontractors".

- a. On all public construction contracts which are let by a board or governing body of the state government or any political subdivision thereof, except contracts let by the Department of Transportation pursuant to N.C. G.S. 136-28.1, the balance due the CM shall be paid in full within 45 days after respective prime contracts of the project have been accepted by the Owner, certified by the architect, engineer or designer to be completed in accordance with terms of the plans and specifications, or occupied by the Owner and used for the purpose for which the project was constructed, whichever occurs first. Provided, however, that whenever the architect or consulting engineer in charge of the project determines that delay in completion of the project in accordance with terms of the plans and specifications is the fault of the CM, the project may be occupied and used for the purposes for which it was constructed without payment of any interest on amounts withheld past the 45 day limit. Should final

payment to the CM beyond the date such contracts have been certified to be completed by the Project Designer, accepted by the Owner, or occupied by the Owner and used for the purposes for which the project was constructed, be delayed by more than 45 days, said CM shall be paid interest, beginning on the 46th day, at the rate of one percent (1%) per month or fraction thereof unless a lower rate is agreed upon on such unpaid balance as may be due. In addition to the above final payment provisions, periodic payments due the CM during construction shall be paid in accordance with the payment provisions of the contract documents or said CM shall be paid interest on any such unpaid amount at the rate stipulated above for delayed final payments. Such interest shall begin on the date the payment is due and continue until the date on which payment is made. Such due date may be established by the terms of the contract. Funds for payment of such interest on state-owned projects shall be obtained from the current budget of the owning department, institution or agency. Where a conditional acceptance of a contract exists, and where the Owner is retaining a reasonable sum pending correction of such conditions, interest on such reasonable sum shall not apply.

- b. Within seven days of receipt by the CM of each periodic or final payment, the CM shall pay the Principal Trade and Specialty Contractors based on work completed or service provided under their contract with the CM. Should any periodic or final payment to a Principal Trade or Specialty Contractor be delayed by more than seven days after receipt of periodic or final payment by the CM, the CM shall pay the Principal Trade or Specialty Contractor interest, beginning on the eighth day, at the rate of one percent (1%) per month or fraction thereof on such unpaid balance as may be due.
- c. The percentage of retainage on payments made by the CM to the Principal Trade and Specialty Contractors shall not exceed the percentage of retainage on payments made by the Owner to the CM. Any percentage of retainage on payments made by the CM to the Principal Trade or Specialty Contractors that exceeds the percentage of retainage on payments made by the Owner to the CM shall be subject to interest to be paid by the CM to the Principal Trade or Specialty Contractor at the rate of one percent (1%) per month or fraction thereof.
- d. Nothing in this section shall prevent the CM at the time of application and certification to the Owner from withholding application and certification to the Owner for payment to a Principal Trade or Specialty Contractor for unsatisfactory job progress; defective construction not remedied; disputed work; third-party claims filed or reasonable evidence that claim will be filed; failure of the Principal Trade or Specialty Contractor to make timely payments for labor, equipment and materials; damage to CM or another subcontractor; reasonable evidence that a Principal Trade or Specialty Contract cannot be completed for the unpaid balance of the subcontract sum; or a reasonable amount for retainage not to exceed the initial percentage retained by Owner.

## **ARTICLE 18 - DESIGNER'S STATUS**

- a. The Project Designer shall provide liaison and necessary inspection of the work to ensure compliance with plans and specifications. He is the agent of the Owner only for the purpose of constructing this work and to the extent stipulated in the contract documents. He has authority to stop work or to order work removed, or to order corrections of faulty work where such action may be necessary to assure successful completion of the work.
- b. The Project Designer is the impartial interpreter of the contract documents, and, as such, he shall exercise his powers under the contract to enforce faithful performance by both the Owner and the CM, taking sides with neither.



- c. Should the Project Designer cease to be employed on the work for any reason whatsoever, then the Owner shall employ a competent replacement who shall assume the status of the former Project Designer.
- d. The Project Designer will make periodic inspections of the project at intervals appropriate to the stage of construction. He will inspect the progress, the quality and the quantity of the work.
- e. The Project Designer and the Owner shall have access to the work whenever it is in preparation and progress during normal working hours. The CM shall provide facilities for such access so the Designer may perform his functions under the contract documents.
- f. Based on the Project Designer's inspections and evaluations of the project, the Project Designer shall issue interpretations, directives and decisions as may be necessary to assist the CM in the administration of the project. His decisions relating to artistic effect and technical matters shall be final, provided such decisions are within the limitations of the contract. The CM's decisions, however, relating to means and methods, and administration of the contracts the CM holds are final.

## **ARTICLE 19 - CHANGES IN THE WORK**

- a. The Owner may have changes made in the work covered by the contract. These changes will not invalidate and will not relieve or release the CM from any guarantee given by him pertinent to the contract provisions. These changes will not affect the validity of the guarantee bond and will not relieve the surety or sureties of said bond. All extra work shall be executed under conditions of the original contract.
- b. Except in an emergency endangering life or property, no change shall be made by the contractor except upon receipt of approved change order or written field order from the designer, countersigned by the owner and the state construction office authorizing such change. No claim for adjustments of the contract price shall be valid unless this procedure is followed.

A field order, transmitted by fax or hand-delivered, may be used where the change involved impacts the critical path of the work. A formal change order shall be issued as expeditiously as possible.

The CM may be requested to make a change to the work by the Project Designer and Owner where such work is to be funded by the CM Contingency or Project Reserve that is part of the GMP contract. Such a change must be documented in the same manner as a Change Order and must be authorized in writing by the Project Designer and Owner by a Field Change document.

In the event of emergency endangering life or property, the CM may be directed to proceed on a time and material basis whereupon the CM shall proceed and keep accurately on such form as may be required, a correct account of costs together with all proper invoices, payrolls and supporting data. Upon completion of the work the change order will be prepared as outlined under either Method "c(1)" or Method "c(2)" or both.

- c. In determining the values of changes, either additive or deductive, the CM and Principal Trade and Specialty Contractors are restricted to the use of the following methods:
  - 1. Where the extra work involved is covered by unit prices quoted in the proposal, the value of the change shall be computed by application of unit prices based on quantities,

estimated or actual as agreed of the items involved, except in such cases where a quantity exceeds the estimated quantity allowance in the contract by one hundred percent (100%) or more. In such cases, either party may elect to proceed under subparagraph c2 herein. If neither party elects to proceed under c2, then unit prices shall apply.

2. The contracting parties shall negotiate and agree upon the equitable value of the change prior to issuance of the change order, and the change order shall stipulate the corresponding lump sum adjustment to the contract price.
- d. Under Paragraph "b" and Methods "c(2)" above, the allowances for overhead and profit combined for a Principal Trade or Specialty Contractor and all multi-tier subcontractors shall not exceed fifteen percent (15%) of **net cost** of the work. No allowance for overhead and profit will be allowed for the CM until the change orders aggregate to a sum in excess of five percent (5%) of the Cost of the Work portion of the GMP. Once this threshold is met the CM may add an overhead & profit allowance not to exceed four percent (4%) of the net cost of the change order. Change orders to the GMP which authorize additional phases of a project without a change in scope of the originally intended project will not be considered in establishing the threshold for additional CM overhead & profit. Under Method "c (1)", no additional allowances shall be made for overhead and profit. In the case of deductible change orders, under Method "c(2)" and Paragraph (b) above, the contractor shall include no less than five percent (5%) profit, but no allowances for overhead.
- e. The term "net cost" as used herein shall mean the difference between all proper cost additions and deductions. The "cost" as used herein shall be limited to the following:
  1. The actual costs of materials and supplies incorporated or consumed as part of the project;
  2. The actual costs of labor expended on the project site;
  3. The actual costs of labor burden, limited to the costs of social security (FICA) and Medicare/Medicaid taxes; unemployment insurance costs; health/dental/vision insurance premiums; paid employee leave for holidays, vacation, sick leave, and/or petty leave, not to exceed a total of 30 days per year; retirement contributions; worker's compensation insurance premiums; and the costs of general liability insurance when premiums are computed based on payroll amounts; the total of which shall not exceed thirty percent (30%) of the actual costs of labor;
  4. The actual costs of rental for tools, excluding hand tools; equipment; machinery; and temporary facilities required for the project;
  5. The actual costs of premiums for bonds, insurance, permit fees and sales or use taxes related to the project.

Overtime and extra pay for holidays and weekends may be a cost item only to the extent approved by the Owner.

- f. Should concealed conditions be encountered in the performance of the work below grade, or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the contract documents, the contract sum and time for completion may be equitably adjusted by change order upon claim by either party made within thirty (30) days after the condition has been identified. The cost of such change shall be arrived at by one of the foregoing methods.

All change orders shall be supported by a breakdown showing method of arriving at net cost as defined above.

- g. In all change orders, the procedure will be for the Project Designer to request proposals for the change order work in writing. The CM will require the Principal Trade and Specialty Contractors to provide such proposals and supporting data in suitable format and will review and approve such change orders prior to submission to the designer. The Project Designer shall verify correctness. Within fourteen (14) days after receipt of the CM's proposal, the Project Designer shall prepare the change order and forward to the CM for his signature or otherwise respond, in writing, to the CM's proposal. Within seven (7) days after receipt of the change order executed by the CM, the Project Designer shall, certify the change order by his signature, and forward the change order and all supporting data to the Owner for the Owner's signature. The Owner shall execute the change order and forward to the State Construction Office for final approval, within seven (7) days of receipt. The State Construction Office shall act on the change order within seven (7) days. Upon approval by the State Construction Office, one copy remains with the State Construction Office, and the remaining copies are sent to the Project Designer for distribution to the Owner(s), CM and the surety. In case of emergency or extenuating circumstances, approval of changes may be obtained verbally by telephone or field orders approved by all parties, then shall be substantiated in writing as outlined under normal procedure.
- h. At the time of signing a change order, the CM shall be required to certify as follows:

"I certify that my bonding company will be notified forthwith that my contract has been changed by the amount of this change order, and that a copy of the approved change order will be mailed upon receipt by me to my surety."
- i. A change order, when issued, shall be full compensation, or credit, for the work included, omitted or substituted. It shall show on its face the adjustment in time for completion of the project as a result of the change in the work.
- j. If, during the progress of the work, the Owner requests a change order and the CM's terms are unacceptable, the Owner, with the approval of the State Construction Office, may require the CM to perform such work on a time and material basis in accordance with paragraph "b" above. Without prejudice, nothing in this paragraph shall preclude the Owner from performing or to have performed that portion of the work requested in the change order.

## **ARTICLE 20 - CLAIMS FOR EXTRA COST**

- a. Should the CM consider that as a result of any instructions given in any form by the designer, he is entitled to extra cost above that stated in the contract, he shall give written notice thereof to the designer within seven (7) days without delay. The written notice shall clearly state that a claim for extra cost is being made and shall provide a detailed justification for the extra cost. The CM shall not proceed with the work affected until further advised, except in emergency involving the safety of life or property, which condition is covered in Article 19(b) and Article 11(h). No claims for extra compensation will be considered unless the claim is so made. The Designer shall render a written decision within seven (7) days of receipt of claim.
- b. The CM shall not act on instructions received by him from persons other than the Project Designer, and any claims for extra compensation or extension of time on account of such instruction will not be honored. The Project Designer will not be responsible for misunderstandings claimed by the CM of verbal instructions which have not been confirmed in writing, and in no case shall instructions be interpreted as permitting a departure from the

contract documents unless such instruction is confirmed in writing and supported by a properly authorized change order.

- c. Should a claim for extra compensation that complies with the requirements of (a) above by the CM be denied by the Project Designer or Owner, and cannot be resolved by a representative of the State Construction Office, the CM may request a mediation in connection with N.C.G.S. 143-128(f1) in the dispute resolution rules adopted by the State Building Commission (1 N.C.A.C. 30H .0101 through .1001). If the CM is unable to resolve its claims as a result of mediation, then the CM may pursue his claim in accordance with the provisions of N.C.G.S. 143-135.3, or G.S. 143-135.6 where Community Colleges are the owner, and the following:
1. A CM who has not completed a contract with a state agency or institution for construction or repair work and who has not received the amount he claims is due under the contract may submit a verified written claim to the Director of the State Construction Office of the Department of Administration for the amount the CM claims is due. The Director may deny, allow or compromise the claim, in whole or in part. A claim under this subsection is not a contested case under N.C.G.S. Chapter 150B.
  2. (a) A CM who has completed a contract with a State agency or institution for construction or repair work and who has not received the amount he claims is due under the contract may submit a verified written claim to the Director of the State Construction Office of the Department of Administration for the amount the CM claims is due. The claim shall be submitted within sixty (60) days after the CM receives a final statement of the board's disposition of his claim and shall state the factual basis for the claim.
    - (b) The Director shall investigate a submitted claim within ninety (90) days of receiving the claim, or within any longer time period upon which the Director and the CM agree. The CM may appear before the Director, either in person or through counsel, to present facts and arguments in support of his claim. The Director may allow, deny or compromise the claim, in whole or in part. The Director shall give the CM a written statement of the Director's decision on the CM's claim.
    - (c) A CM who is dissatisfied with the Director's decision on a claim submitted under this subsection may commence a contested case on the claim under Chapter 150B of the General Statutes. The contested case shall be commenced within sixty (60) days of receiving the Director's written statement of the decision.
    - (d) As to any portion of a claim that is denied by the Director, the CM may, in lieu of the procedures set forth in the preceding subsection of this section, within six (6) months of receipt of the Director's final decision, institute a civil action for the sum he claims to be entitled to under the contract by filing a verified complaint and the issuance of a summons in the Superior Court of Wake County or in the superior court of any county where the work under the contract was performed. The procedure shall be the same as in all civil actions except that all issues shall be tried by the judge, without a jury.

## **ARTICLE 21 - MINOR CHANGES IN THE WORK**

The Project Designer will have the authority to order minor changes in the work not involving an adjustment in the contract sum or time for completion, and not inconsistent with the intent of the contract documents. Such changes shall be effected by written order, copied to the State Construction Office, and shall be binding on the Owner and the CM.

## **ARTICLE 22 - UNCORRECTED FAULTY WORK**

Should the correction of faulty or damaged work be considered inadvisable or inexpedient by the Owner and the Project Designer, the Owner shall be reimbursed by the CM. A change order will be issued to reflect a reduction in the contract sum.

## **ARTICLE 23 - TIME OF COMPLETION, DELAYS, EXTENSION OF TIME**

- a. The final completion date will be as determined by the Owner, Designer and CM during the pre-construction phase of the project and will be incorporated into the contract for construction services between the Owner and the CM.
- b. The CM shall commence work to be performed under this agreement on a date to be specified in a written Notice to Proceed from the Project Designer and shall fully complete all work hereunder within the time of completion specified. For each day in excess of the above number of days, the CM shall pay the Owner the sum stated as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of the CM to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof. Should the work be delayed by both the owner and contractor, liquidated damages shall be apportioned to reflect the delays of each party. In the case of concurrent delays, contractor caused delays shall be accounted for before owner and designer caused delays.
- c. If the CM is delayed at any time in the progress of his work by any act or negligence of the Owner or the Project Designer, or by any employee of either; by changes ordered in the work; by labor disputes at the project site; by abnormal weather conditions not reasonably anticipated for the locality where the work is performed; by unavoidable casualties; by any causes beyond the contractor's control; or by any other causes which the designer and Owner determine may justify the delay, then the contract time may be extended by change order for the time which the designer and Owner may determine is reasonable.

Time extensions will not be granted for rain, wind, snow or other natural phenomena of normal intensity for the locality where work is performed. For purpose of determining extent of delay attributable to unusual weather phenomena, a determination shall be made by comparing the weather for the contract period involved with the average of the preceding five (5) year climatic range during the same time interval based on the National Oceanic and Atmospheric Administration National Weather Service statistics for the locality where work is performed and on daily weather logs kept on the job site by the CM reflecting the effect of the weather on progress of the work and initialed by the designer's representative. No weather delays shall be considered after the building is dried in unless work claimed to be delayed is on the critical path of the baseline schedule or approved updated schedule. Time extensions for weather delays, acts of God, labor disputes, fire, delays in transportation, unavoidable casualties or other delays which are beyond the control of the Owner do not entitle the Contractor to compensable damages for delays. Any contractor claim for compensable damages for delays is limited to delays caused solely by the owner or its agents. Contractor caused delays shall be accounted for before owner or designer caused delays in the case of concurrent delays.

- d. Request for extension of time shall be made in writing to the designer, copies to the owner and SCO, within twenty (20) days following cause of delay. In case of continuing cause for delay, the CM shall notify the designer copies to the owner and SCO, of the delay within twenty (20) days of the beginning of the delay and only one claim is necessary.
- e. The CM shall notify his surety in writing of extension of time granted.
- f. No claim shall be allowed on account of failure of the Project Designer to furnish drawings or instructions until twenty (20) days after demand for such drawings and/or instructions. See Article 5c. Demand must be in written form clearly stating the potential for delay unless the drawings or instructions are provided. Any delay granted will begin after the twenty (20) day demand period is concluded.

## **ARTICLE 24 - PARTIAL UTILIZATION/BENEFICIAL OCCUPANCY**

- a. The Owner may desire to occupy or utilize all or a portion of the project when the work is substantially complete.
- b. Should the owner request a utilization of a building or portion thereof, the designer shall perform a designer final inspection of area after being notified by the contractor that the area is ready for such. After the contractor has completed designer final inspection punch list and the designer has verified, then the designer shall schedule a beneficial occupancy inspection at a time and date acceptable to the owner, contractor(s) and State Construction Office. If beneficial occupancy is granted by the State Construction Office, in such areas the following will be established:
  - 1. The beginning of guarantees and warranties period for the equipment necessary to support. in the area.
  - 2. The owner assumes all responsibilities for utility costs for entire building.
  - 3. Contractor will obtain consent of surety.
  - 4. Contractor will obtain endorsement from insurance company permitting beneficial occupancy.
- c. The Owner shall have the right to exclude the CM from any part of the project which the Project Designer has so certified to be substantially complete, but the Owner will allow the CM reasonable access to complete or correct work to bring it into compliance with the contract.
- d. Occupancy by the Owner under this article will in no way relieve the CM from his contractual requirement to complete the project within the specified time. The contractor will not be relieved of liquidated damages because of beneficial occupancy. The designer may prorate liquidated damages based on the percentage of project occupied.

## **ARTICLE 25 - FINAL INSPECTION, ACCEPTANCE, AND PROJECT CLOSEOUT**

- a. Upon notification from the CM that the project is complete and ready for inspection, the Project Designer shall make a designer final inspection to verify that the project is complete and ready for SCO final inspection. Prior to SCO final inspection, the CM shall ensure that all items requiring corrective measures noted at the designer final inspection are complete.

The Project Designer shall schedule an SCO final inspection at a time and date acceptable to the Owner, the CM and the State Construction Office.

- b. At the SCO final inspection, the designer and his consultants shall, if job conditions warrant, record a list of items that are found to be incomplete or not in accordance with the contract documents. At the conclusion of the SCO final inspection, the designer and State Construction Office representative shall make the following determinations:
  - 1. That the project is completed and accepted.
  - 2. That the project is accepted subject to the correction of the list of discrepancies (punch list). All punch list items must be completed within thirty (30) days of SCO final inspection or the Owner may invoke Article 28, Owner's Right to Do Work.
  - 3. That the project is not complete and another date for a final inspection will be established.
- c. Within fourteen (14) days of acceptance per Paragraph c1 or within fourteen (14) days after completion of punch list per Paragraph c2 above, the Project Designer shall certify the work and issue applicable certificate(s) of compliance.
- d. Any discrepancies listed or discovered after the date of SCO final inspection and acceptance under Paragraphs c1 or c2 above shall be handled in accordance with Article 42.
- e. The date of acceptance will establish the following:
  - 1. The beginning of guarantees and warranties period.
  - 2. The date on which the CM's insurance coverage for public liability, property damage and builder's risk may be terminated.
  - 3. That no liquidated damages (if applicable) shall be assessed after this date.
  - 4. The termination date of utility cost to the CM (if applicable).
- f. **Prior to issuance of final acceptance date, the contractor shall have his authorized representatives visit the project and give full instructions to the designated personnel regarding operating, maintenance, care, and adjustment of all equipment and special construction elements. In addition, the contractor shall provide to the owner a complete instructional video (media format acceptable to the owner) on the operation, maintenance, care and adjustment of all equipment and special construction elements.**

## **ARTICLE 26 - CORRECTION OF WORK BEFORE FINAL PAYMENT**

- a. Any work, materials, fabricated items or other parts of the work which have been condemned or declared not in accordance with the contract by the designer shall be promptly removed from the work site by the CM, and shall be immediately replaced by new work in accordance with the contract at no additional cost to the Owner. Work or property of the Owner, damaged or destroyed by virtue of such faulty work, shall be made good at the expense of the CM.
- b. Correction of condemned work described above shall commence within twenty-four (24) hours after receipt of notice from the Project Designer, and shall make satisfactory progress until completed.

- c. Should the CM fail to proceed with the required corrections, then the Owner may complete the work in accordance with the provisions of Article 28.

## **ARTICLE 27 - CORRECTION OF WORK AFTER FINAL PAYMENT**

See Article 35, Performance Bond and Payment Bond, and Article 42, Guarantee. Neither the final certificate, final payment, occupancy of the premises by the Owner, nor any provision of the contract, nor any other act or instrument of the Owner, nor the Project Designer, shall relieve the CM from responsibility for negligence, or faulty material or workmanship, or failure to comply with the drawings and specifications. The CM shall correct or make good any defects due thereto and repair any damage resulting therefrom, which may appear during the guarantee period following final acceptance of the work except as stated otherwise under Article 42, Guarantee. The Owner will report any defects as they may appear to the CM and establish a time limit for completion of corrections by the CM. The Owner will be the judge as to the responsibility for correction of defects.

## **ARTICLE 28 - OWNER'S RIGHT TO DO WORK**

If, during the progress of the work or during the period of guarantee, the CM fails to prosecute the work properly or to perform any provision of the contract, the Owner, after seven (7) days written notice sent by certified mail, return receipt requested, to the CM from the designer, may perform or have performed that portion of the work. The cost of the work may be deducted from any amounts due or to become due to the CM, such action and cost of same having been first approved by the Project Designer. Should the cost of such action of the Owner exceed the amount due or to become due the CM, then the CM or his surety, or both, shall be liable for and shall pay to the Owner the amount of said excess.

## **ARTICLE 29 - ANNULMENT OF CONTRACT**

If the CM fails to begin the work under the contract within the time specified or fails to establish a GMP or obtain bids from or enter into contracts with qualified Principal Trade or Specialty Contractors within the GMP, or the progress of the work is not maintained on schedule, or the work is not completed within the time above specified, or fails to perform the work with sufficient workmen and equipment or with sufficient materials to ensure the prompt completion of said work, or shall perform the work unsuitably or shall discontinue the prosecution of the work, or if the CM shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the work in an acceptable manner, the Owner may give notice in writing, sent by certified mail, return receipt requested, to the CM and his surety of such delay, neglect or default, specifying the same, and if the CM within a period of seven(7) days after such notice shall not proceed in accordance therewith, then the Owner shall, declare this contract in default, and, thereupon, the surety shall promptly take over the work and complete the performance of this contract in the manner and within the time frame specified. In the event the surety shall fail to take over the work to be done under this contract within seven(7) days after being so notified and notify the Owner in writing, sent by certified mail, return receipt requested, that he is taking the same over and stating that he will diligently pursue and complete the same, the Owner shall have full power and authority, without violating the contract, to take the prosecution of the work out of the hands of said CM, to appropriate or use any or all contract materials and equipment on the grounds as may be suitable and acceptable and may enter into an agreement, either by public letting or negotiation, for the completion of said contract according to the terms and provisions thereof or use such other methods as in his opinion shall be required for the completion of said contract in an acceptable manner. All costs and charges incurred by the Owner, together with the costs of completing the



work under contract, shall be deducted from any monies due or which may become due said CM and surety. In case the expense so incurred by the Owner shall be less than the sum which would have been payable under the contract, if it had been completed by said CM, then the said CM and surety shall be entitled to receive the difference, but in case such expense shall exceed the sum which would have been payable under the contract, then the CM and the surety shall be liable and shall pay to the Owner the amount of said excess.

#### **ARTICLE 30 – CONSTRUCTION MANAGER’S RIGHT TO STOP WORK OR TERMINATE THE CONTRACT**

- a. Should the work be stopped by order of a court having jurisdiction, or by order of any other public authority for a period of three months, due to cause beyond the fault or control of the CM, or if the Owner should fail or refuse to make payment on account of a certificate issued by the designer within forty-five (45) days after receipt of same, then the CM, after fifteen (15) days' written notice sent by certified mail, return receipt requested, to the Owner and the designer, may suspend operations on the work or terminate the contract.
- b. The Owner shall be liable to the CM for the cost of all materials delivered and work performed on this contract plus ten (10) percent overhead and profit and shall make such payment. The designer shall be the judge as to the correctness of such payment.

#### **ARTICLE 31 - REQUEST FOR PAYMENT**

- a. Not later than the fifth day of the month, the CM shall submit to the designer a request for payment for work done during the previous month. The request shall be in the form agreed upon between the CM and the designer, but shall show substantially the value of work done and materials delivered to the site during the period since the last payment, and shall sum up the financial status of the contract with the following information:
  1. Total of contract including change orders.
  2. Value of work completed to date.
  3. Less five percent (5%) retainage, provided however, that after fifty percent (50%) of the CM's work has been satisfactorily completed on schedule, with approval of the owner and the State Construction Office and written consent of the surety, further requirements for retainage will be waived only so long as work continues to be completed satisfactorily and on schedule.
  4. Less previous payments.
  5. Current amount due.
- b. Prior to submitting the first payment request, the CM shall prepare a schedule showing a breakdown of the contract price into values of the various parts of the GMP contract. The Cost of the Work breakdown will be arranged so as to facilitate payments to the Principal Trade and Specialty Contractors in accordance with Article 17. The combined CM Construction Management Fee, Bonds & Insurance, CM Contingency, and Project Reserve (if any) will be shown on the Schedule of values as separate lines. The values for the CM Contingency and Project Reserve (if any) will move to appropriate lines within the Cost of the Work as those funds are committed and expended. This schedule of values will be submitted to & approved by the designer and Owner within 30 days of the Notice to Proceed.

The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the designer and Owner may require.

- c. Applications for payment shall be in a form agreed upon by the CM, designer and Owner and shall be prepared and supported by such data to substantiate the accuracy of the request as the designer may require.
- d. Subject to other provisions of the contract documents, the amount of each progress payment shall be computed as follows:
  - 1. Take that portion of the GMP properly allocable to completed work as determined by multiplying the percentage completion of each portion Cost of the Work by the share of the GMP allocated to that portion of the work in the schedule of values.
  - 2. Add that portion of the GMP properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the work or if approved in advance by the Owner, suitably stored off site at a location agreed upon in writing.
  - 3. Subtract the aggregate of previous payments made by the Owner.
  - 4. Subtract the amount, in any, by which the CM has been previously overpaid, as evidenced by the Owner's review of the CM's documentation.
  - 5. Subtract amounts, if any, for which the Project Designer has withheld or nullified a certificate of payment.
  - 6. Subtract retainage as per paragraph (h) below.
  - 7. Add the amount due for the CM Construction Management Fee calculated on the basis the percentage completion of the project or on a schedule of payment negotiated with the Owner less fifteen percent (15%) and less previous payments for CM Construction Management Fee.
- e. Payment allocated to Principal Trade and Specialty Contractors shall be subject to five percent (5%) retainage, provided, however that after fifty percent (50%) of the Cost of the Work has been satisfactorily completed on schedule, with the approval of the Owner and the State Construction Office and with written consent of the surety, further requirements for retainage will be waived only so long as work continues to be completed satisfactorily and on schedule. The balance of the CM Construction Management Fee shall be held by the Owner until satisfactory completion and close out of the project. Satisfactory completion and close out of the project means that the Owner and Project Designer are satisfied that the project has been completed in accordance with the plans and specifications and within the GMP, all general conditions of the contract pertaining to close out have been satisfied, and all Principal Trade and Specialty Contractors have satisfactorily completed their respective contracts. No retainage will be held for the cost of Bonds and Insurance
- f. When payment is made on account of stored materials and equipment, such materials must be stored on the owner's property, and the requests for payments shall be accompanied by invoices or bills of sale or other evidence to establish the owner's title to such materials and equipment. Such payments will be made only for materials that have been customized or fabricated specifically for this project. Raw materials or commodity products including but not limited to piping, conduit, CMU, metal studs and gypsum board may not be submitted. Responsibility for such stored materials and equipment shall remain with the CM regardless

of ownership title. Such stored materials and equipment shall not be removed from the owner's property. Should the space for storage on-site be limited, the CM, at his option, shall be permitted to store such materials and/or equipment in a suitable space off-site. Should the CM desire to include any such materials or equipment in his application for payment, they must be stored in the name of the owner in an independent, licensed, bonded warehouse approved by the designer, owner and the State Construction Office and located as close to the site as possible. The warehouse selected must be approved by the CM's bonding and insurance companies; the material to be paid for shall be assigned to the owner and shall be inspected by the designer. Upon approval by the designer, owner and SCO of the storage facilities and materials and equipment, payment therefore will be certified. Responsibility for such stored materials and equipment shall remain with the CM. Such stored materials and equipment shall not be moved except for transportation to the project site. Under certain conditions, the designer may approve storage of materials at the point of manufacture, which conditions shall be approved by the designer, the owner and the State Construction Office prior to approval for the storage and shall include an agreement by the storing party which unconditionally gives the State absolute right to possession of the materials at anytime. Bond, security and insurance protection shall continue to be the responsibility of the CM.

- g. In the event of beneficial occupancy, retainage of funds due the CM may be reduced with the approval of the State Construction Office to an equitable amount to cover the list of items to be completed or corrected. Retainage may not be reduced to less than two and one-half (2 1/2) times the estimated value of the work to be completed or corrected. Reduction of retainage must be with the consent and approval of the CM's bonding company.

## **ARTICLE 32 - CERTIFICATES OF PAYMENT AND FINAL PAYMENT**

- a. Within five (5) days from receipt of request for payment from the CM, the designer shall issue and forward to the Owner a certificate for payment. This certificate shall indicate the amount requested or as approved by the designer. If the certificate is not approved by the designer, he shall state in writing to the CM and the Owner his reasons for withholding payment.
- b. No certificate issued or payment made shall constitute an acceptance of the work or any part thereof. The making and acceptance of final payment shall constitute a waiver of all claims by the Owner except:
  - 1. Claims arising from unsettled liens or claims against the CM.
  - 2. Faulty work or materials appearing after final payment.
  - 3. Failure of the contractor to perform the work in accordance with drawings and specifications, such failure appearing after payment.
  - 4. As conditioned in the performance bond and payment bond.
- c. The making and acceptance of final payment shall constitute a waiver of all claims by the CM except those claims previously made and remaining unsettled (Article 20(c)).
- d. Prior to submitting request for final payment to the designer for approval, the CM shall fully comply with all requirements specified in the "project closeout" section of the specifications. These requirements include but not limited to the following:
  - 1. Submittal of Product and Operating Manuals, Warranties and Bonds, Guarantees, Maintenance Agreements, As-Built Drawings, Certificates of Inspection or Approval

from agencies having jurisdiction. (The designer must approve the Manuals prior to delivery to the Owner).

2. Transfer of required attic stock material and all keys in an organized manner.
  3. Record of Owner's training.
  4. Resolution of any final inspection discrepancies.
  5. Granting access to Contractor's records, if Owner's internal auditors have made a request for such access pursuant to Article 52.
- e. The CM shall forward to the designer, the final application for payment along with the following documents:
1. List of minority business subcontractors and material suppliers showing breakdown of contracts amounts and total actual payments to subcontractors and material suppliers.
  2. Affidavit of Release of Liens.
  3. Affidavit from CM of payment to material suppliers and subcontractors. (See Article 36).
  4. Consent of Surety to Final Payment.
  5. Certificates of state agencies required by state law.
- f. The designer will not authorize final payment until the work under contract has been certified by Project Designer, certificates of compliance issued, and the CM has complied with the closeout requirements. The designer shall forward the CM's final application for payment to the Owner along with respective certificate(s) of compliance required by law.

### **ARTICLE 33 - PAYMENTS WITHHELD**

- a. The designer with the approval of the State Construction Office may withhold payment for the following reasons:
1. Faulty work not corrected.
  2. The unpaid balance on the contract is insufficient to complete the work in the judgment of the designer.
  3. To provide for sufficient contract balance to cover liquidated damages that will be assessed against the CM.
- b. The Secretary of the Department of Administration may authorize the withholding of payment for the following reasons:
1. Claims filed against the CM or evidence that a claim will be filed.
  2. Evidence that Principal Trade or Specialty Contractors have not been paid.

- c. The Owner may withhold all or a portion of CM's Project Management Fee costs set forth in the approved schedule of values, if CM has failed to comply with: (1) a request to access its records by Owner's internal auditors pursuant to Article 52; (2) a request for a plan of action and/or recovery schedule under Article 14.j or provide The Owner; (3) a request to provide an electronic copies of Contractor's baseline schedule, updates with all logic used to create the schedules in the original format of the scheduling software; and (4) Contractor's failure to have its Superintendent on the Project full-time.
- d. When grounds for withholding payments have been removed, payment will be released. Delay of payment due the CM without cause will make owner liable for payment of interest to the CM in accordance with G.S. 143-134.1. As provided in G.S.143-134.1(e) the owner shall not be liable for interest on payments withheld by the owner for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the owner or reasonable evidence that a third-party claim will be filed.

## **ARTICLE 34 - MINIMUM INSURANCE REQUIREMENTS**

The work under this contract shall not commence until the CM has verified to the Owner that all required insurance and verifying certificates of insurance have been obtained and approved in writing by the Owner. These certificates shall contain a provision that coverage's afforded under the policies will not be cancelled, reduced in amount or coverage's eliminated until at least thirty (30) days after mailing written notice, by certified mail, return receipt requested, to the insured and the Owner of such alteration or cancellation.

### **a. Worker's Compensation and Employer's Liability**

The CM shall ensure that it and all Principal Trade and Specialty Contractors shall provide and maintain, during the life of the contract, workmen's compensation insurance, as required by law, as well as employer's liability coverage with minimum limits of \$100,000.

### **b. Public Liability and Property Damage**

The CM shall ensure that it and all Principal Trade and Specialty Contractors shall provide and maintain, during the life of the contract, comprehensive general liability insurance, including coverage for premises operations, independent contractors, completed operations, products and contractual exposures, as shall protect such contractors from claims arising out of any bodily injury, including accidental death, as well as from claims for property damages which may arise from operations under this contract, whether such operations be by the contractor or by any subcontractor, or by anyone directly or indirectly employed by either of them and the minimum limits of such insurance shall be as follows:

Bodily Injury:	\$500,000 per occurrence
Property Damage:	\$100,000 per occurrence / \$300,000 aggregate

In lieu of limits listed above, a \$500,000 combined single limit shall satisfy both conditions.

Such coverage for completed operations must be maintained for at least two (2) years following final acceptance of the work performed under the contract.

### **c. Property Insurance (Builder's Risk/Installation Floater)**

The CM shall ensure that it and all Principal Trade and Specialty Contractors shall purchase and maintain property insurance during the life of this contract, upon the entire work at the

site to the full insurable value thereof. This insurance shall include the interests of the Owner, the CM, and subcontractors in the work and shall insure against the perils of fire, extended coverage, and vandalism and malicious mischief. If the Owner is damaged by failure of the CM to purchase or maintain such insurance, then the CM shall bear all reasonable costs properly attributable thereto; the CM shall effect and maintain similar property insurance on portions of the work stored off the site when request for payment per articles so includes such portions.

**d. Deductible**

Any deductible, if applicable to loss covered by insurance provided, is to be borne by the CM and/or the Principal Trade or Specialty Contractor as applicable.

**e. Other Insurance**

The CM shall ensure that it and all Principal Trade and Specialty Contractors shall obtain such additional insurance as may be required by the Owner or by the General Statutes of North Carolina including motor vehicle insurance, in amounts not less than the statutory limits.

**f. Proof of Carriage**

The CM shall ensure that it and all Principal Trade and Specialty Contractors shall furnish the Owner with satisfactory proof of carriage of the insurance required before written approval is granted by the Owner.

## **ARTICLE 35 - PERFORMANCE BOND AND PAYMENT BOND**

- a. The CM shall furnish a performance bond and payment bond executed by a surety company authorized to do business in North Carolina. The bonds shall be in the full contract amount, which shall be in the amount of the GMP for the entire project. Bonds shall be executed in the form bound with the specifications
- b. All bonds shall be countersigned by an authorized agent of the bonding company who is licensed to do business in North Carolina.

## **ARTICLE 36 - CONTRACTOR'S AFFIDAVIT**

The final payment of retained amount due the CM on account of the contract shall not become due until the CM has furnished to the Owner through the designer an affidavit signed, sworn and notarized to the effect that all payments for materials, services or subcontracted work to Principal Trade and Specialty Contractors in connection with his contract have been satisfied, and that no claims or liens exist against the CM in connection with this contract. In the event that the CM cannot obtain similar affidavits from the Principal Trade and Specialty Contractors to protect the CM and the Owner from possible liens or claims against the subcontractor, the CM shall state in his affidavit that no claims or liens exist against any subcontractor to the best of his (the CM's) knowledge, and if any appear afterward, the CM shall save the Owner harmless.

## **ARTICLE 37 - ASSIGNMENTS**

The CM shall not assign any portion of this contract nor subcontract in its entirety. Except as may be required under terms of the performance bond or payment bond, no funds or sums of money due or become due the CM under the contract may be assigned.

## **ARTICLE 38 - USE OF PREMISES**

- a. The CM shall confine his apparatus, the storage of materials and the operations of his workmen to limits indicated by law, ordinances, permits or directions of the designer and shall not exceed those established limits in his operations.
- b. The CM shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.
- c. The CM shall enforce the designer's and owner's instructions regarding signs, advertisements, fires and smoking.
- d. No firearms, any type of alcoholic beverages or drugs (other than those prescribed by a physician) will be permitted at the job site.

## **ARTICLE 39 - CUTTING, PATCHING AND DIGGING**

- a. The CM shall ensure that all cutting, fitting or patching that may be required to make the work come together properly and fit it to receive or be received by work of other contractors shown upon or reasonably implied by the drawings and specifications for the completed structure, as the designer may direct.
- b. Any cost brought about by defective or ill-timed work shall be borne by the party responsible therefor.
- c. No Principal Trade or Specialty Contractor shall endanger any work of another such contractor by cutting, digging or other means, nor shall he cut or alter the work of any other such contractor without the consent of the designer and the affected contractor(s).

## **ARTICLE 40 - UTILITIES, STRUCTURES, SIGNS**

- a. The CM shall provide necessary and adequate facilities for water, electricity, gas, oil, sewer, and other utility services, which may be necessary and required for completion of the project. If the Owner specifies that the CM is to pay all utilities, any permanent meters installed shall be listed in the CM's name until his work is fully accepted by the Owner. As stipulated in the Supplementary General Conditions, the Owner may: (1) pay utilities cost directly, (2) require the CM to pay all utilities cost, (3) or reimburse the CM for the actual cost of utilities. The Owner or CM, as applicable, may recover actual costs of metered utilities from the responsible party should delays occur in project completion. Coordination of the work of the utility companies during construction is the sole responsibility of the CM.
- b. If applicable Meters shall be relisted in the Owner's name on the day following completion and acceptance of the CM's work, and the Owner shall pay for services used after that date.
- c. Prior to the operation of permanent systems, the CM will provide temporary power, lighting, water, and heat to maintain space temperature above freezing, as required for construction operations.
- d. The CM shall ensure that the permanent building systems are in sufficient readiness for furnishing temporary climatic control at the time a building is enclosed and secured. The HVAC systems shall maintain climatic control throughout the enclosed portion of the building sufficient to allow completion of the interior finishes of the building. A building shall be considered enclosed and secured when windows, doorways (exterior, mechanical, and

electrical equipment rooms), and hardware are installed; and other openings have protection, which will provide reasonable climatic control. The appropriate time to start the mechanical systems and climatic condition shall be jointly determined by the CM and the designer. Use of the equipment in this manner shall in no way affect the warranty requirements of the CM.

- e. The CM shall coordinate the work so that the building's permanent power wiring distribution system shall be in sufficient readiness to provide power as required by the HVAC contractor for temporary climatic control.
- f. The CM shall coordinate the work so that the building's permanent lighting system shall be ready at the time interior painting and finishing begins and shall provide adequate lighting in those areas where interior painting and finishing is being performed.
- g. The CM shall be responsible for his permanently fixed service facilities and systems in use during progress of the work. The following procedures shall be strictly adhered to:
  - 1. Prior to acceptance of work by the State Construction Office, the CM shall coordinate the removal and replacement of any parts of the permanent building systems damaged through use during construction.
  - 2. Temporary filters as recommended by the equipment manufacturer in order to keep the equipment and ductwork clean and free of dust and debris shall be installed in each of the heating and air conditioning units and at each return grille during construction. New filters shall be installed in each unit prior to the Owner's acceptance of the work.
  - 3. Extra effort shall be maintained to keep the building and the site adjacent to the building clean and under no circumstances shall air systems be operated if finishing and site work operations are creating dust in excess of what would be considered normal if the building were occupied.
  - 4. It shall be understood that any warranty on equipment presented to the Owner shall extend from the day of final acceptance by the Owner. The cost of warranting the equipment during operation in the finishing stages of construction shall be borne by the contractor whose system is utilized.
  - 5. The CM shall ensure that all lamps are in proper working condition at the time of final project acceptance.
- h. The CM shall provide, if required and where directed, a shed for toilet facilities and shall furnish and install in this shed all water closets required for a complete and adequate sanitary arrangement. These facilities will be available to other contractors on the job and shall be kept in a neat and sanitary condition at all times. Chemical toilets are acceptable.
- i. The CM shall, if required by the Supplementary General Conditions and where directed, erect a temporary field office, complete with lights, telephone, heat and air conditioning. A portion of this office shall be partitioned off, of sufficient size, for the use of a resident inspector, should the designer so direct.
- j. On multi-story construction projects, the CM shall either provide or ensure that temporary elevators, lifts, or other necessary special equipment is available for the general use of all contractors. The cost for such elevators, lifts or other special equipment and the operation thereof shall either be included in the CM Construction Management Fee or specified as part of the work of a Principal Trade or Specialty Contractor and paid for as a part of the Cost of the Work.



- k. The CM will erect one sign on the project if required. The sign shall be of sound construction, and shall be neatly lettered with black letters on white background. The sign shall bear the name of the project, and the CM's name, and the name of the designer and consultants. Directional signs may be erected on the Owner's property subject to approval of the Owner with respect to size, style and location of such directional signs. Such signs may bear the name of the contractor and a directional symbol. No other signs will be permitted except by permission of the Owner.

#### **ARTICLE 41 - CLEANING UP**

- a. The CM shall ensure that the building and surrounding area is reasonably free from rubbish at all times, and shall remove debris from the site on a timely basis or when directed to do so by the designer. The CM shall provide an on-site refuse container(s) for the use of all Principal Trade and Specialty Contractors. The CM shall ensure that each Principal Trade and Specialty Contractor removes their rubbish and debris from the building on a daily basis. The CM shall ensure that the building is broom cleaned as required to minimize dust and dirt accumulation.
- b. The CM shall provide and maintain suitable all-weather access to the building.
- c. Before final inspection and acceptance of the building, the CM shall ensure that all portions of the work are clean, including glass, hardware, fixtures, masonry, tile and marble (using no acid), clean and wax all floors as specified, and completely prepare the building for use by the Owner, with no cleaning required by the Owner.

#### **ARTICLE 42 - GUARANTEE**

- a. The CM shall unconditionally guarantee materials and workmanship against patent defects arising from faulty materials, faulty workmanship or negligence for a period of twelve (12) months following the date of final acceptance of the work or beneficial occupancy and shall replace such defective materials or workmanship without cost to the Owner.
- b. Where items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material. The CM shall replace such defective equipment or materials, without cost to the Owner, within the manufacturer's warranty period.
- c. Additionally, the Owner may bring an action for latent defects caused by the negligence of the CM, which is hidden or not readily apparent to the Owner at the time of beneficial occupancy or final acceptance, whichever occurred first, in accordance with applicable law.
- d. Guarantees for roof, equipment, materials, and supplies shall be stipulated in the specifications sections governing such roof, equipment, materials, or supplies.

#### **ARTICLE 43 - CODES AND STANDARDS**

Wherever reference is given to codes, standard specifications or other data published by regulating agencies including, but not limited to, national electrical codes, North Carolina State Building Codes, federal specifications, ASTM specifications, various institute specifications, etc., it shall be understood that such reference is to the latest edition including addenda published prior to the date of the contract documents.

## ARTICLE 44 - INDEMNIFICATION

To the fullest extent permitted by law, the CM shall indemnify and hold harmless the Owner, the designer and the agents, consultants and employees of the Owner and designer, from and against all claims, damages, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance or failure of performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the CM, the CM's subcontractor, or the agents of either the CM or the CM's subcontractor. Such obligation shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this article.

## ARTICLE 45 - TAXES

- a. Federal excise taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3442(3)).
- b. Federal transportation taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3475(b) as amended).
- c. North Carolina sales tax and use tax, as required by law, do apply to materials entering into state work and such costs shall be included in the bid proposal and contract sum.
- d. Local option sales and use taxes, as required by law, do apply to materials entering into state work as applicable and such costs shall be included in the bid proposal from Principal Trade and specialty Contractors and contract sum.
- e. Accounting Procedures for Refund of County Sales & Use Tax

Amount of county sales and use tax paid per CM's statements:

CM's performing contracts for state agencies shall ensure that the Principal Trade and Specialty Contractors provide information to allow the CM to give the state agency for whose project the materials, supplies, fixtures and/or equipment was purchased a signed statement containing the information listed in N.C.G.S. 105-164.14(e).

The Department of Revenue has agreed that in lieu of obtaining copies of sales receipts from contractors, an agency may obtain a certified statement from the contractors setting forth the date, the type of property and the cost of the property purchased from each vendor, the county in which the vendor made the sale and the amount of local sales and use taxes paid thereon. If the property was purchased out-of-state, the county in which the property was delivered should be listed. The contractor should also be notified that the certified statement may be subject to audit.

In the event the contractors make several purchases from the same vendor, such certified statement must indicate the invoice numbers, the inclusive dates of the invoices, the total amount of the invoices, the counties, and the county sales and use taxes paid thereon.

Name of taxing county: The position of a sale is the retailer's place of business located within a taxing county where the vendor becomes contractually obligated to make the sale. Therefore, it is important that the county tax be reported for the county of sale rather than the county of use.

When property is purchased from out-of-state vendors and the county tax is charged, the county should be identified where delivery is made when reporting the county tax.

Such statement must also include the cost of any tangible personal property withdrawn from the contractor's warehouse stock and the amount of county sales or use tax paid thereon by the CM.

Contractors are not to include any tax paid on supplies, tools and equipment which they use to perform their contracts and should include only those building materials, supplies, fixtures and equipment which actually become a part of or annexed to the building or structure.

#### **ARTICLE 46 - EQUAL OPPORTUNITY CLAUSE**

The non-discrimination clause contained in Section 202 (Federal) Executive Order 11246, as amended by Executive Order 11375, relative to equal employment opportunity for all persons without regard to race, color, religion, sex or national origin, and the implementing rules and regulations prescribed by the Secretary of Labor, are incorporated herein.

#### **ARTICLE 47 - EMPLOYMENT OF INDIVIDUALS WITH DISABILITIES**

The CM agrees not to discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant is qualified. The CM agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices.

#### **ARTICLE 48 - ASBESTOS-CONTAINING MATERIALS (ACM)**

The State of North Carolina has attempted to address all asbestos-containing materials that are to be disturbed in the project. However, there may be other asbestos-containing materials in the work areas that are not to be disturbed and do not create an exposure hazard. Construction Managers are reminded of the requirements of instructions under General Conditions of the Contract, titled Examination of Conditions. Statute 130A, Article 19, amended August 3, 1989, established the Asbestos Hazard Management Program that controls asbestos abatement in North Carolina. The latest edition of *Guideline Criteria for Asbestos Abatement* from the State Construction Office is to be incorporated in all asbestos abatement projects for the Capital Improvement Program.

#### **ARTICLE 49 - MINORITY BUSINESS PARTICIPATION**

N.C.G.S. 143-128.2 establishes a ten percent (10%) goal for participation by minority businesses in total value of work for each State building project and requires documentation of good faith efforts for meeting that goal. The document, *Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts* including Affidavits and Appendix F are hereby incorporated into and made a part of this contract.

The CM shall identify and define contract packages (the value of which shall total to at least ten percent (10%) of the GMP) that remove barriers to participation commonly experienced by Historically Underutilized Businesses and Minority Business Enterprises as those terms are defined in North Carolina General Statute 143-128.2, hereinafter referred to as Reduced Barrier Packages (RBP). Such contract packages will be submitted to the Owner for review. As an example, RBP's may require no performance or payment bond, or may offer the participation of the CM as a guarantor or surety in the financing of material purchases by the Principal Trade and/or Specialty Contractors, provided that the CM may condition such financing participation upon the

issuance of joint checks or other similar arrangements to allow the CM to verify that timely payments are made to suppliers furnishing credit. The CM may propose other and/or additional provisions for reducing barriers to participation.

The Owner shall require the CM to submit a plan for compliance with N.C.G.S.143-128.2 by approval by the Owner prior to soliciting bids for the Principal Trade and Specialty Contracts. The CM and Principal Trade and Specialty Contractors shall make a good faith effort to recruit and select minority businesses for participation in contracts pursuant to N.C.G.S. 143-128.2.

## **ARTICLE 50 – CONTRACTOR EVALUATION**

The CM's overall work performance on the project shall be fairly evaluated in accordance with the State Building Commission policy and procedures, for determining qualifications to compete for future capital improvement projects for institutions and agencies of the State of North Carolina. In addition to final evaluation, interim evaluation may be prepared during the progress of project. The document, Construction Manager Evaluation Procedures, is hereby incorporated and made a part of this contract. The Owner may request the CM's comments to evaluate the designer.

## **ARTICLE 51 – GIFTS**

Pursuant to N.C. Gen. Stat. § 133-32, it is unlawful for any vendor or contractor ( i.e. architect, bidder, contractor, construction manager, design professional, engineer, subcontractor, supplier, vendor, etc.), to make gifts or to give favors to any State employee. This prohibition covers those vendors and contractors who: (1) have a contract with a governmental agency; or (2) have performed under such a contract within the past year; or (3) anticipate bidding on such a contract in the future. For additional information regarding the specific requirements and exemptions, vendors and contractors are encouraged to review G.S. Sec. 133-32.

During the construction of the Project, the Contractor is prohibited from making gifts to any of the Owner's employees, Owner's project representatives (architect, engineers, construction manager and their employees), employees of the State Construction Office and/or any other State employee that may have any involvement, influence, responsibilities, oversight, management and/or duties that pertain to and/or relate to the contract administration, financial administration and/or disposition of claims arising from and/or relating to the Contract and/or Project.

## **ARTICLE 52 – AUDITING-ACCESS TO PERSONS AND RECORDS**

In accordance with N.C. General Statute 147-64.7, the State Auditor shall have access to Contractor's officers, employees, agents and/or other persons in control of and/or responsible for the Contractor's records that relate to this Contracts for purposes of conducting audits under the referenced statute. The Owner's internal auditors shall also have the right to access and copy the Contractor's records relating to the Contract and Project during the term of the Contract and within two years following the completion of the Project/close-out of the Contract to verify accounts, accuracy, information, calculations and/or data affecting and/or relating to Contractor's requests for payment, requests for change orders, change orders, claims for extra work, requests for time extensions and related claims for delay/extended general conditions costs, claims for lost productivity, claims for loss efficiency, claims for idle equipment or labor, claims for price/cost

escalation, pass-through claims of subcontractors and/or suppliers, and/or any other type of claim for payment or damages from Owner and/or its project representatives.

## **ARTICLE 53 – NORTH CAROLINA FALSE CLAIMS ACT**

The North Carolina False Claims Act (“NCFCA”), N.C Gen. Stat. § 1-605 through 1-618, applies to this Contract. The Contractor should familiarize itself with the entire NCFCA and should seek the assistance of an attorney if it has any questions regarding the NCFCA and its applicability to any requests, demands and/or claims for payment its submits to the State through the contracting state agency, institution, university or community college.

The purpose of the NCFCA “is to deter persons from knowingly causing or assisting in causing the State to pay claims that are false or fraudulent and to provide remedies in the form of treble damages and civil penalties when money is obtained from the State by reason of a false or fraudulent claim.” (Section 1-605(b).) A contractor’s liability under the NCFCA may arise from, but is not limited to: requests for payment, invoices, billing, claims for extra work, requests for change orders, requests for time extensions, claims for delay damages/extended general conditions costs, claims for loss productivity, claims for loss efficiency, claims for idle equipment or labor, claims for price/cost escalation, pass-through claims of subcontractors and/or suppliers, documentation used to support any of the foregoing requests or claims, and/or any other request for payment from the State through the contracting state agency, institution, university or community college. The parts of the NCFCA that are most likely to be enforced with respect to this type of contract are as follows:

- A “claim” is “[a]ny request or demand, whether under a contract or otherwise, for money or property and whether or not the State has title to the money or property that (i) is presented to an officer, employee, or agent of the State or (ii) is made to a contractor ... if the money or property is to be spent or used on the State's behalf or to advance a State program or interest and if the State government: (a) provides or has provided any portion of the money or property that is requested or demanded; or (b) will reimburse such contractor ... for any portion of the money or property which is requested or demanded.” (Section 1-606(2).)
- "Knowing" and "knowingly." – Whenever a person, with respect to information, does any of the following: (a) Has actual knowledge of the information; (b) Acts in deliberate ignorance of the truth or falsity of the information; and/or (c) Acts in reckless disregard of the truth or falsity of the information. (Section 1-606(4).) Proof of specific intent to defraud is not required. (Section 1-606(4).)
- "Material" means having a natural tendency to influence, or be capable of influencing, the payment or receipt of money or property. (Section 1-606(4).)
- Liability. – “Any person who commits any of the following acts shall be liable to the State for three times the amount of damages that the State sustains because of the act of that person[:] ... (1) Knowingly presents or causes to be presented a false or fraudulent claim for payment or

approval. (2) Knowingly makes, uses, or causes to be made or used, a false record or statement material to a false or fraudulent claim. (3) Conspires to commit a violation of subdivision (1), (2) ...” (Section 1-607(a)(1), (2).)

- The NCFCA shall be interpreted and construed so as to be consistent with the federal False Claims Act, 31 U.S.C. § 3729, et seq., and any subsequent amendments to that act. (Section 1-616(c).)

Finally, the contracting state agency, institution, university or community college may refer any suspected violation of the NCFCA by the Contractor to the Attorney General’s Office for investigation. Under Section 1-608(a), the Attorney General is responsible for investigating any violation of NCFCA, and may bring a civil action against the Contractor under the NCFCA. The Attorney General’s investigation and any civil action relating thereto are independent and not subject to any dispute resolution provision set forth in this Contract. (See Section 1-608(a).)

#### **ARTICLE 54 – TERMINATION FOR CONVENIENCE**

- a. Owner may at any time and for any reason terminate CM’s services and work at Owner's convenience. Upon receipt of such notice, CM shall, unless the notice directs otherwise, immediately discontinue the work and placing of orders for materials, facilities and supplies in connection with the performance of this Agreement.
- b. Upon such termination, CM shall be entitled to payment only as follows: (1) the actual cost of the work completed in conformity with this Agreement; plus, (2) such other costs actually incurred by CM as are permitted by the prime contract and approved by Owner; (3) plus ten percent (10%) of the cost of the work referred to in subparagraph (1) above for overhead and profit. There shall be deducted from such sums as provided in this subparagraph the amount of any payments made to CM prior to the date of the termination of this Agreement. CM shall not be entitled to any claim or claim of lien against Owner for any additional compensation or damages in the event of such termination and payment.

**DOCUMENT 002121**

**SUPPLEMENTARY CONDITIONS OF THE CONTRACT**

**1.1 SUPPLEMENTARY CONDITIONS**

- A. The General Conditions of the Contract Form OC-15M "General Conditions of the Contract Standard Form for Construction Manager-At-Risk Projects" is modified by the following "Supplementary Conditions of the Contract for Construction."
1. General Conditions Article 1.b.:
    - a. Replace "The Owner is the State of North Carolina by and through the agency or institution named in the contract." With "The Owner is the Trustees of Durham Tech Community College."
  2. General Conditions Article 14.d.:
    - a. Delete "an engineer or".
  3. General Conditions Article 23.a.:
    - a. Replace "The final completion date will be as determined by the Owner, Designer and CM during the pre-construction phase of the project and will be incorporated into the contract for construction services between the Owner and the CM." with "The final completion date shall be March 15, 2027."
  4. General Conditions Article 38.d.:
    - a. Add the following sentence to the end of the paragraph: "Contractor shall post a sign indicating Firearms are prohibited on the construction site."
  5. General Conditions Article 40.a.:
    - a. Replace "As stipulated in the Supplementary General Conditions, the Owner may: (1) pay utilities cost directly, (2) require the CM to pay all utilities cost, (3) or reimburse the CM for the actual cost of utilities." with "As stipulated in the Supplementary Conditions of the Contract for Construction, the Owner requires the CM to pay all utilities cost."
  6. General Conditions Article 40.i.:
    - a. Delete ", if required by the Supplementary General Conditions and where directed,".
- B. These "Supplementary Conditions of the Contract for Construction" are part of the Contract Documents.

**END OF DOCUMENT**





**DOCUMENT 002211**

**GUIDELINES FOR MINORITY BUSINESS ENTERPRISE REQUIREMENTS**

- A. N.C.G.S. 143-128.2 establishes a ten percent (10%) goal for participation by minority businesses in total value of work for each State building project and requires documentation of good faith efforts for meeting that goal.
- B. The Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts is bound herein after and made a part of this Contract.

**END OF DOCUMENT**



# **GUIDELINES FOR RECRUITMENT AND SELECTION OF MINORITY BUSINESSES FOR PARTICIPATION IN STATE CONSTRUCTION CONTRACTS**

In accordance with G.S. 143-128.2 (effective January 1, 2002) these guidelines establish goals for minority participation in single-prime bidding, separate-prime bidding, construction manager at risk, and alternative contracting methods, on State construction projects in the amount of \$300,000 or more. The legislation provides that the State shall have a verifiable ten percent (10%) goal for participation by minority businesses in the total value of work for each project for which a contract or contracts are awarded. These requirements are published to accomplish that end.

## **SECTION A: INTENT**

It is the intent of these guidelines that the State of North Carolina, as awarding authority for construction projects, and the contractors and subcontractors performing the construction contracts awarded shall cooperate and in good faith do all things legal, proper and reasonable to achieve the statutory goal of ten percent (10%) for participation by minority businesses in each construction project as mandated by GS 143-128.2. Nothing in these guidelines shall be construed to require contractors or awarding authorities to award contracts or subcontracts to or to make purchases of materials or equipment from minority-business contractors or minority-business subcontractors who do not submit the lowest responsible, responsive bid or bids.

## **SECTION B: DEFINITIONS**

1. Minority - a person who is a citizen or lawful permanent resident of the United States and who is:
  - a. Black, that is, a person having origins in any of the black racial groups in Africa;
  - b. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
  - c. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, the Pacific Islands;
  - d. American Indian, that is, a person having origins in any of the original peoples of North America; or
  - e. Female
2. Minority Business - means a business:
  - a. In which at least fifty-one percent (51%) is owned by one or more minority persons, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and
  - b. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.
3. Socially and economically disadvantaged individual - means the same as defined in 15 U.S.C. 637. "Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or cultural bias because of their identity as a member of a group without regard to their individual qualities". "Economically disadvantaged individuals are those socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged".
4. Public Entity - means State and all public subdivisions and local governmental units.
5. Owner - The State of North Carolina, through the Agency/Institution named in the contract.
6. Designer - Any person, firm, partnership, or corporation, which has contracted with the State of North Carolina to perform architectural or engineering, work.
7. Bidder - Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.

8. Contract - A mutually binding legal relationship or any modification thereof obligating the seller to furnish equipment, materials or services, including construction, and obligating the buyer to pay for them.
9. Contractor - Any person, firm, partnership, corporation, association, or joint venture which has contracted with the State of North Carolina to perform construction work or repair.
10. Subcontractor - A firm under contract with the prime contractor or construction manager at risk for supplying materials or labor and materials and/or installation. The subcontractor may or may not provide materials in his subcontract.

## **SECTION C: RESPONSIBILITIES**

1. Office for Historically Underutilized Businesses, Department of Administration (hereinafter referred to as HUB Office).

The HUB Office has established a program, which allows interested persons or businesses qualifying as a minority business under G.S. 143-128.2, to obtain certification in the State of North Carolina procurement system. The information provided by the minority businesses will be used by the HUB Office to:

- a. Identify those areas of work for which there are minority businesses, as requested.
- b. Make available to interested parties a list of prospective minority business contractors and subcontractors.
- c. Assist in the determination of technical assistance needed by minority business contractors.

In addition to being responsible for the certification/verification of minority businesses that want to participate in the State construction program, the HUB Office will:

- (1) Maintain a current list of minority businesses. The list shall include the areas of work in which each minority business is interested.
- (2) Inform minority businesses on how to identify and obtain contracting and subcontracting opportunities through the State Construction Office and other public entities.
- (3) Inform minority businesses of the contracting and subcontracting process for public construction building projects.
- (4) Work with the North Carolina trade and professional organizations to improve the ability of minority businesses to compete in the State construction projects.
- (5) The HUB Office also oversees the minority business program by:
  - a. Monitoring compliance with the program requirements.
  - b. Assisting in the implementation of training and technical assistance programs.
  - c. Identifying and implementing outreach efforts to increase the utilization of minority businesses.
  - d. Reporting the results of minority business utilization to the Secretary of the Department of Administration, the Governor, and the General Assembly.

2. State Construction Office

The State Construction Office will be responsible for the following:

- a. Furnish to the HUB Office a minimum of twenty-one days prior to the bid opening the following:
  - (1) Project description and location;
  - (2) Locations where bidding documents may be reviewed;
  - (3) Name of a representative of the owner who can be contacted during the advertising period to advise who the prospective bidders are;
  - (4) Date, time and location of the bid opening.
  - (5) Date, time and location of prebid conference, if scheduled.
- b. Attending scheduled prebid conference, if necessary, to clarify requirements of the general statutes regarding minority-business participation, including the bidders' responsibilities.

- c. Reviewing the apparent low bidders' statutory compliance with the requirements listed in the proposal, that must be complied with, if the bid is to be considered as responsive, prior to award of contracts. The State reserves the right to reject any or all bids and to waive informalities.
- d. Reviewing of minority business requirements at Preconstruction conference.
- e. Monitoring of contractors' compliance with minority business requirements in the contract documents during construction.
- f. Provide statistical data and required reports to the HUB Office.
- g. Resolve any protest and disputes arising after implementation of the plan, in conjunction with the HUB Office.

### 3. Owner

Before awarding a contract, owner shall do the following:

- a. Develop and implement a minority business participation outreach plan to identify minority businesses that can perform public building projects and to implement outreach efforts to encourage minority business participation in these projects to include education, recruitment, and interaction between minority businesses and non-minority businesses.
- b. Attend the scheduled prebid conference.
- c. At least 10 days prior to the scheduled day of bid opening, notify minority businesses that have requested notices from the public entity for public construction or repair work and minority businesses that otherwise indicated to the Office for Historically Underutilized Businesses an interest in the type of work being bid or the potential contracting opportunities listed in the proposal. The notification shall include the following:
  - 1. A description of the work for which the bid is being solicited.
  - 2. The date, time, and location where bids are to be submitted.
  - 3. The name of the individual within the owner's organization who will be available to answer questions about the project.
  - 4. Where bid documents may be reviewed.
  - 5. Any special requirements that may exist.
- d. Utilize other media, as appropriate, likely to inform potential minority businesses of the bid being sought.
- e. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
- f. Review, jointly with the designer, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and affidavit listing good faith efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award to the State Construction Office.
- g. Evaluate documentation to determine good faith effort has been achieved for minority business utilization prior to recommendation of award to State Construction Office.
- h. Review prime contractors' pay applications for compliance with minority business utilization commitments prior to payment.
- i. Make documentation showing evidence of implementation of Owner's responsibilities available for review by State Construction Office and HUB Office, upon request

### 4. Designer

Under the single-prime bidding, separate prime bidding, construction manager at risk, or alternative contracting method, the designer will:

- a. Attend the scheduled prebid conference to explain minority business requirements to the prospective bidders.
- b. Assist the owner to identify and notify prospective minority business prime and subcontractors of potential contracting opportunities.
- c. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
- d. Review jointly with the owner, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with

corresponding total dollar value of the bid and affidavit listing Good Faith Efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award.

- e. During construction phase of the project, review “MBE Documentation for Contract Payment” – (Appendix E) for compliance with minority business utilization commitments. Submit Appendix E form with monthly pay applications to the owner and forward copies to the State Construction Office.
- f. Make documentation showing evidence of implementation of Designer’s responsibilities available for review by State Construction Office and HUB Office, upon request.

5. Prime Contractor(s), CM at Risk, and Its First-Tier Subcontractors

Under the single-prime bidding, the separate-prime bidding, construction manager at risk and alternative contracting methods, contractor(s) will:

- a. Attend the scheduled prebid conference.
- b. Identify or determine those work areas of a subcontract where minority businesses may have an interest in performing subcontract work.
- c. At least ten (10) days prior to the scheduled day of bid opening, notify minority businesses of potential subcontracting opportunities listed in the proposal. The notification will include the following:
  - (1) A description of the work for which the subbid is being solicited.
  - (2) The date, time and location where subbids are to be submitted.
  - (3) The name of the individual within the company who will be available to answer questions about the project.
  - (4) Where bid documents may be reviewed.
  - (5) Any special requirements that may exist, such as insurance, licenses, bonds and financial arrangements.

If there are more than three (3) minority businesses in the general locality of the project who offer similar contracting or subcontracting services in the specific trade, the contractor(s) shall notify three (3), but may contact more, if the contractor(s) so desires.

- d. During the bidding process, comply with the contractor(s) requirements listed in the proposal for minority participation.
- e. Identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).
- f. Make documentation showing evidence of implementation of PM, CM-at-Risk and First-Tier Subcontractor responsibilities available for review by State Construction Office and HUB Office, upon request.
- g. Upon being named the apparent low bidder, the Bidder shall provide one of the following: (1) an affidavit (Affidavit C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal; (2) if the percentage is not equal to the applicable goal, then documentation of all good faith efforts taken to meet the goal. Failure to comply with these requirements is grounds for rejection of the bid and award to the next lowest responsible and responsive bidder.
- h. The contractor(s) shall identify the name(s) of minority business subcontractor(s) and corresponding dollar amount of work on the schedule of values. The schedule of values shall be provided as required in Article 31 of the General Conditions of the Contract to facilitate payments to the subcontractors.
- i. The contractor(s) shall submit with each monthly pay request(s) and final payment(s), “MBE Documentation for Contract Payment” – (Appendix E), for designer’s review.
- j. During the construction of a project, at any time, if it becomes necessary to replace a minority business subcontractor, immediately advise the owner, State Construction Office, and the Director of the HUB Office in writing, of the circumstances involved. The prime contractor shall make a good faith effort to replace a minority business subcontractor with another minority business subcontractor.

- k. If during the construction of a project additional subcontracting opportunities become available, make a good faith effort to solicit subbids from minority businesses.
- l. It is the intent of these requirements apply to all contractors performing as prime contractor and first tier subcontractor under construction manager at risk on state projects.

6. **Minority Business Responsibilities**

While minority businesses are not required to become certified in order to participate in the State construction projects, it is recommended that they become certified and should take advantage of the appropriate technical assistance that is made available. In addition, minority businesses who are contacted by owners or bidders must respond promptly whether or not they wish to submit a bid.

**SECTION 4: DISPUTE PROCEDURES**

It is the policy of this state that disputes that involves a person's rights, duties or privileges, should be settled through informal procedures. To that end, minority business disputes arising under these guidelines should be resolved as governed under G.S. 143-128(g).

**SECTION 5:** These guidelines shall apply upon promulgation on state construction projects. Copies of these guidelines may be obtained from the Department of Administration, State Construction Office, (physical address) 301 North Wilmington Street, Suite 450, NC Education Building, Raleigh, North Carolina, 27601-2827, (mail address) 1307 Mail Service Center, Raleigh, North Carolina, 27699-1307, phone (919) 807-4100, Website: [www.nc-sco.com](http://www.nc-sco.com)

**SECTION 6:** In addition to these guidelines, there will be issued with each construction bid package provisions for contractual compliance providing minority business participation in the state construction program.

## MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

### APPLICATION:

The **Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts** are hereby made a part of these contract documents. These guidelines shall apply to all contractors regardless of ownership. Copies of these guidelines may be obtained from the Department of Administration, State Construction Office, (physical address) 301 North Wilmington Street, Suite 450, NC Education Building, Raleigh, North Carolina, 27601-2827, (mail address) 1307 Mail Service Center, Raleigh, North Carolina, 27699-1307, phone (919) 807-4100, Website: <http://www.nc-sco.com>

### MINORITY BUSINESS SUBCONTRACT GOALS:

The goals for participation by minority firms as subcontractors on this project have been set at 10%.

The bidder must identify on its bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit (Affidavit A) listing good faith efforts or affidavit (Affidavit B) of self-performance of work, if the bidder will perform work under contract by its own workforce, as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).

The lowest responsible, responsive bidder must provide Affidavit C, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal.

**OR**

Provide Affidavit D, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, **with documentation of Good Faith Effort, if the percentage is not equal to the applicable goal.**

**OR**

Provide Affidavit B, which includes sufficient information for the State to determine that the bidder does not customarily subcontract work on this type project.

**The above information must be provided as required. Failure to submit these documents is grounds for rejection of the bid.**



## **MINIMUM COMPLIANCE REQUIREMENTS:**

All written statements, affidavits or intentions made by the Bidder shall become a part of the agreement between the Contractor and the State for performance of this contract. Failure to comply with any of these statements, affidavits or intentions, or with the minority business Guidelines shall constitute a breach of the contract. A finding by the State that any information submitted either prior to award of the contract or during the performance of the contract is inaccurate, false or incomplete, shall also constitute a breach of the contract. Any such breach may result in termination of the contract in accordance with the termination provisions contained in the contract. It shall be solely at the option of the State whether to terminate the contract for breach.

In determining whether a contractor has made Good Faith Efforts, the State will evaluate all efforts made by the Contractor and will determine compliance in regard to quantity, intensity, and results of these efforts. Good Faith Efforts include:

- (1) Contacting minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor or available on State or local government maintained lists at least 10 days before the bid or proposal date and notifying them of the nature and scope of the work to be performed.
- (2) Making the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bid or proposals are due.
- (3) Breaking down or combining elements of work into economically feasible units to facilitate minority participation.
- (4) Working with minority trade, community, or contractor organizations identified by the Office for Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- (5) Attending any prebid meetings scheduled by the public owner.
- (6) Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors.
- (7) Negotiating in good faith with interested minority businesses and not rejecting them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- (8) Providing assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- (9) Negotiating joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- (10) Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

## APPENDIX E

### MBE DOCUMENTATION FOR CONTRACT PAYMENTS

Prime Contractor/Architect: \_\_\_\_\_

Address & Phone: \_\_\_\_\_

Project Name: \_\_\_\_\_

Pay Application #: \_\_\_\_\_ Period: \_\_\_\_\_

The following is a list of payments made to Minority Business Enterprises on this project for the above-mentioned period.

MBE FIRM NAME	* INDICATE TYPE OF MBE	AMOUNT PAID THIS MONTH	TOTAL PAYMENTS TO DATE	TOTAL AMOUNT COMMITTED

\*Minority categories: Black, African American (B), Hispanic (H), Asian American (A), American Indian (I), Female (F), Social and Economically Disadvantage (D)

Date: \_\_\_\_\_ Approved/Certified By: \_\_\_\_\_

Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

**SUBMIT WITH EACH PAY REQUEST & FINAL PAYMENT**

Durham Technical Community College  
**Life Sciences Building – Early Equipment Package**  
Durham, North Carolina  
Andre Johnson Architect Project No. P2309.00  
SCO ID No.:23-26245-02B  
NCCCS No.: 2731

April 02, 2025

**DOCUMENT 002212**

**PREQUALIFICATION REQUIREMENTS**

- A. The State of North Carolina Prequalification Policy is bound herein after.

**END OF DOCUMENT**



# State of North Carolina

## Prequalification Policy

### A. **Governing Law (Session Law 2014-42)**

This policy is in effect for all prequalifications on State of NC work, including single prime project delivery and construction manager at risk first-tier subcontractors. G.S. 143-135.8(b)(2) requires the governmental entity to “adopt an objective prequalification policy applicable to all construction or repair work prior to the advertisement of the contract for which the governmental entity intends to prequalify bidders.” This policy satisfies this requirement for State agencies and universities and the community colleges.

### B. **Requirements for Prequalification Criteria Form and Assessment**

1. Uniform, consistent, and transparent in its application to all bidders.
2. All bidders who meet the prequalification criteria to be prequalified are allowed to bid on the construction or repair work project.
3. Criteria must be rationally related to construction or repair work.
4. The bidder is not required to have been previously awarded a construction or repair project by the governmental entity.
5. Bidders are permitted to submit history or experience with projects of similar size, scope, or complexity
6. Assessment process of prequalification is stated in this policy.
7. A process for a denied bidder to protest is stated below in this policy.
8. A process for notifying a denied prequalified bidder is stated below in this policy.

### C. **Review of Application**

1. **Prequalification Committee** – The owner and/or construction manager shall agree upon the members of the prequalification committee. The Prequalification Official (For State Agencies, the Director of State Construction; for Universities, the Chief Financial Officer (CFO) of the University Campus for projects under \$500,000, between \$500,000 and \$2,000,000 the Associate Vice President for Finance and Capital Planning with University of North Carolina – General Administration, for projects over \$2,000,000 the Director of State Construction; and for Community Colleges, under \$500,000 the Director of Administrative and Facility Services with Community Colleges System Office and over \$500,000 the Director of State Construction) shall not be on the prequalification committee. The prequalification committee will review prequalification applications submitted by the firms and will determine each firm’s prequalification eligibility for the project.
2. **Review of Application** – The prequalification committee shall use the objective assessment process form developed by the State Construction Office. The prequalification committee shall approve or deny the applications in accordance with the prequalification criteria and scoring system based upon the applicants’ initial response to the Owning Agency’s solicitation for qualified bidders. With the possible protests and appeals on prequalification and the times associated with responses, the owner should have the advertisement for prequalification out to potential applicants at least two (2) months prior to actual bid date.
3. **Notice of Decision** – All firms that submitted applications for prequalification shall be promptly notified of the prequalification committee’s decision, including the reason for denial, via e-mail. Notice shall be provided prior to the opening of bids for the project and with sufficient time for the firm to appeal the denial of prequalification.
4. **Informal Meeting** - Upon denial, the applicant may request an informal meeting with the owner’s representative and/or construction manager to receive feedback and suggestions for

## State of North Carolina Prequalification Policy

improvement. The Owner's representative and/or construction manager shall hold a feedback session for the applicants who do not appeal the decision within 2 weeks of the request.

5. Firms wishing to appeal the decision shall follow the appeals process described below.

### D. Appeals Procedure

1. The firm may appeal the denial of Prequalification as noted below.
  - a. **Initial Protest** – A firm denied prequalification may protest the prequalification committee's decision by filing a written appeal via hand-delivery or e-mail to the applicable prequalification committee within three (3) business days of emailed notice that the firm has been denied prequalification. The written appeal shall clearly articulate the reasons why the firm is contesting the denial (i.e., explains how the firm satisfied all required criteria for prequalification in the government's solicitation in their initial response) and attach all documents supporting the firm's position. The prequalification committee may contact the firm regarding the information provided prior to ruling on the protest. The Prequalification Committee should review the written protest within five (5) business days. If the prequalification committee is satisfied that the firm should be prequalified, the firm shall be notified that it is prequalified to bid on the project and allowed to participate in the bid process. If the prequalification committee upholds its denial, the firm shall be notified in writing via e-mail.
  - b. **Appeal** – Within three (3) business days of the owner's emailed notice of the Prequalification Committee's written protest decision, the denied prequalified firm may appeal the prequalification committee's decision, in writing, via hand-delivery or e-mail, to the Prequalification Official (see C.1 above). The Prequalification Official should review the appeal within five (5) business days. In the event the Prequalification Official is unable to review in a timely manner, he/she may designate a representative that is not a member of the prequalification committee to handle the appeal.
  - c. **Decision on Appeal** – The decision of the Prequalification Official or Representative on the appeal shall be final, and the firm shall be promptly notified of the decision.
  - d. **General Rules for Protests and Appeals** – Firms submitting prequalification applications shall be provided an e-mail address for the communication with the owner and/or construction manager during the protest and appeal process. The firm shall provide at least two e-mail addresses for use by the owner and/or construction manager in communicating with the firm. In the event the Prequalification Official or Representative is unable to render a decision on either the initial protest or the appeal prior to the bid date, the firm shall be allowed to submit a bid on the project subject to a final decision on the protest or appeal. If the firm's bid is opened prior to a final decision on the protest or appeal and the bid is not the lowest monetary bid for the project, the appeal shall be terminated and rendered moot. Bids received from firms who have been ruled disqualified to bid shall not be opened. A firm's failure to comply with any requirements of the protest and appeals procedures of this section shall result in the firm's protest or appeal being terminated and rendered moot.

Durham Technical Community College  
**Life Sciences Building – Early Equipment Package**  
Durham, North Carolina  
Andre Johnson Architect Project No. P2309.00  
SCO ID No.:23-26245-02B  
NCCCS No.: 2731

April 02, 2025

**DOCUMENT 003313**

**CONTRACTOR'S STATEMENT OF RESPONSIBILITY**

- A. The Contractor's Statement of Responsibility is bound herein after.

**END OF DOCUMENT**





Durham Technical Community College  
**Life Sciences Building – Early Equipment Package**  
Durham, North Carolina  
Andre Johnson Architect Project No. P2309.00  
SCO ID No.:23-26245-02B  
NCCCS No.: 2731

April 02, 2025

SCO ID#: 23-26245-02A

BUDGET CODE: \_\_\_\_\_ ITEM: \_\_\_\_\_ DATE: 00/00/00

OWNER: Trustees of Durham Tech Community College

DESIGNER: Andre Johnson Architects, PLLC

PRIME CONTRACTOR: \_\_\_\_\_

CONTRACTOR RESPONSIBLE: \_\_\_\_\_

SYSTEM/COMPONENT: Describe System Subject to QA Procedures

I (we) acknowledge the special requirements outlined in the quality assurance plan. I (we) also acknowledge that control will be exercised to obtain conformance with the construction documents as approved by the Office of State Construction.

The following procedures will be established and strictly followed to maintain control within our organization:

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The following reporting will be submitted to the Special Inspector, Owner and Office of State Construction at the following frequency:

Reporting method: \_\_\_\_\_

Frequency: \_\_\_\_\_

The following individuals(s) will be responsible for monitoring the procedures as set forth above:

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Qualifications: \_\_\_\_\_

Signed this \_\_\_\_ day of \_\_\_\_\_

\_\_\_\_\_  
*Name*

\_\_\_\_\_  
*Title*



**DOCUMENT 004113 - FORM OF PROPOSAL**

**1.1 FORM OF PROPOSAL**

- A. Bidders must submit their bid using the Form of Proposal, bound hereinafter.

**END OF DOCUMENT**



# FORM OF PROPOSAL

Life Sciences Building  
Durham Tech Community College  
SCO ID: 23-26245-02B

Contract: \_\_\_\_\_  
Bidder: \_\_\_\_\_  
Date: \_\_\_\_\_

The undersigned, as bidder, hereby declares that the only person or persons interested in this proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The bidder further declares that he has examined the site of the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed. The bidder further declares that he and his subcontractors have fully complied with NCGS 64, Article 2 in regards to E-Verification as required by Section 2.(c) of Session Law 2013-418, codified as N.C. Gen. Stat. § 143-129(j).

The Bidder proposes and agrees if this proposal is accepted to contract with the  
**Trustees of Durham Tech Community College**

in the form of contract specified below, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of

Life Sciences Building, Durham Tech Community College

*(Title or Brief Description of Work Scope)*

in full in complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the **State of North Carolina**, and the

Trustees of Durham Tech Community College and Andre Johnson Architects, PLLC.

*(Agency, Department or Institution and Designer)*

with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and the contract documents, for the sum of:

## **SINGLE PRIME CONTRACT:**

Base Bid: \_\_\_\_\_ Dollars(\$)

General Subcontractor:  
\_\_\_\_\_ Lic \_\_\_\_\_

Plumbing Subcontractor:  
\_\_\_\_\_ Lic \_\_\_\_\_

Mechanical Subcontractor:  
\_\_\_\_\_ Lic \_\_\_\_\_

Electrical Subcontractor:  
\_\_\_\_\_ Lic \_\_\_\_\_

GS143-128(d) requires all single prime bidders to identify their subcontractors for the above subdivisions of work. A contractor whose bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except (i) if the listed subcontractor's bid is later determined by the contractor to be non-responsible or non-responsive or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work, or (ii) with the approval of the awarding authority for good cause shown by the contractor.

## **SEPARATE PRIME CONTRACTS: (For Separate or Dual Bidding only)**

## **GENERAL CONSTRUCTION CONTRACT:**

Base Bid:

Dollars(\$)

**PLUMBING CONTRACT:**

Base Bid:

Dollars(\$)

**HEATING, VENTILATION AND AIR CONDITIONING CONTRACT:**

Base Bid:

Dollars(\$)

**ELECTRICAL CONTRACT:**

Base Bid:

Dollars(\$)

Under separate prime contracts, the ??????? Contractor shall act as project expeditor for all prime contracts. See Supplementary General Conditions.

**ALTERNATES:**

Should any of the alternates as described in the contract documents be accepted, the amount written below shall be the amount to be "added to" or "deducted from" the base bid. (Strike out "Add" or "Deduct" as appropriate.)

*(Note to designer: Additive alternates are preferred and are more cost advantageous to the Owner)*

**GENERAL CONTRACT:**

Alternate No. G-1 *(Brief Description)*

(Add) *(Deduct)*

Dollars(\$)

**PLUMBING CONTRACT:**

Alternate No. P-1 *(Brief Description)*

(Add) *(Deduct)*

Dollars(\$)

**HVAC CONTRACT:**

Alternate No. H-1 *(Brief Description)*

(Add) *(Deduct)*

Dollars(\$)

**ELECTRICAL CONTRACT:**

Alternate No. E-1 *(Brief Description)*

(Add) *(Deduct)*

Dollars (\$)

## UNIT PRICES

Unit prices quoted and accepted shall apply throughout the life of the contract, except as otherwise specifically noted. Unit prices shall be applied, as appropriate, to compute the total value of changes in the base bid quantity of the work all in accordance with the contract documents.

### GENERAL CONTRACT:

No. 1 (Brief Description) (Unit) Unit Price (\$)\_\_\_\_\_

### PLUMBING CONTRACT:

No. 1 (Brief Description) (Unit) Unit Price (\$)\_\_\_\_\_

### HVAC CONTRACT:

No. 1 (Brief Description) (Unit) Unit Price (\$)\_\_\_\_\_

### ELECTRICAL CONTRACT:

No. 1 (Brief Description) (Unit) Unit Price (\$)\_\_\_\_\_

The bidder further proposes and agrees hereby to commence work under this contract on a date to be specified in a written order of the designer and shall fully complete all work thereunder within the time specified in the Supplementary General Conditions Article 23. Applicable liquidated damages amount is also stated in the Supplementary General Conditions Article 23.

## MINORITY BUSINESS PARTICIPATION REQUIREMENTS

Provide with the bid - Under GS 143-128.2(c) the undersigned bidder shall identify on its bid (Identification of Minority Business Participation Form) the minority businesses that it will use on the project with the total dollar value of the bids that will be performed by the minority businesses. **Also** list the good faith efforts (Affidavit **A**) made to solicit minority participation in the bid effort.

**NOTE:** A contractor that performs all of the work with its own workforce may submit an Affidavit (**B**) to that effect in lieu of Affidavit (**A**) required above. The MB Participation Form must still be submitted even if there is zero participation.

After the bid opening - The Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. Upon notification of being the apparent low bidder, the bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:

An Affidavit (**C**) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort and Affidavit **D** is not necessary;

\* **OR** \*

If less than the 10% goal, Affidavit (**D**) of its good faith effort to meet the goal shall be provided. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

**Note:** Bidders must always submit with their bid the Identification of Minority Business Participation Form listing all MB contractors, vendors and suppliers that will be used. If there is no MB participation, then enter none or zero on the form. Affidavit **A** **or** Affidavit **B**, as applicable, also must be submitted with the bid. Failure to file a required affidavit or documentation with the bid or after being notified apparent low bidder is grounds for rejection of the bid.

## Proposal Signature Page

The undersigned further agrees that in the case of failure on his part to execute the said contract and the bonds within ten (10) consecutive calendar days after being given written notice of the award of contract, the certified check, cash or bid bond accompanying this bid shall be paid into the funds of the owner's account set aside for the project, as liquidated damages for such failure; otherwise the certified check, cash or bid bond accompanying this proposal shall be returned to the undersigned.

Respectfully submitted this day of \_\_\_\_\_

\_\_\_\_\_  
(Name of firm or corporation making bid)

WITNESS:

\_\_\_\_\_  
(Proprietorship or Partnership)

By: \_\_\_\_\_  
Signature

Name: \_\_\_\_\_  
Print or type

Title \_\_\_\_\_  
(Owner/Partner/Pres./V.Pres)

Address \_\_\_\_\_

ATTEST:

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corp. Sec. or Asst. Sec. only)

License No. \_\_\_\_\_

Federal I.D. No. \_\_\_\_\_

Email Address: \_\_\_\_\_

(CORPORATE SEAL)

Addendum received and used in computing bid:

Addendum No. 1 \_\_\_\_\_ Addendum No. 3 \_\_\_\_\_ Addendum No. 5 \_\_\_\_\_ Addendum No. 6 \_\_\_\_\_

Addendum No. 2 \_\_\_\_\_ Addendum No. 4 \_\_\_\_\_ Addendum No. 6 \_\_\_\_\_ Addendum No. 7 \_\_\_\_\_



**DOCUMENT 004311**

**MBE CONTRACTOR LIST AND AFFIDAVITS**

**1.1 MBE CONTRACTOR LIST FORM**

- A. HUB Certified/ Minority Business Participation is required to be identified on the form entitled "Identification of HUB Certified/ Minority Business Participation" bound hereinafter.

**1.2 MBE CONTRACTOR AFFIDAVITS FORMS**

- A. Bidders are required to complete the following Affidavits forms, bound hereinafter.
  - 1. State of North Carolina Affidavit A – Listing of Good Faith Efforts.
  - 2. State of North Carolina Affidavit B – Intent to Perform Contract with Own Workforce.
  - 3. State of North Carolina Affidavit C – Portion of the Work to be Performed by HUB Certified/Minority Business.
  - 4. State of North Carolina Affidavit D – Good Faith Efforts.

**END OF DOCUMENT**



## Identification of HUB Certified/ Minority Business Participation

I, \_\_\_\_\_  
(Name of Bidder)

do hereby certify that on this project, we will use the following HUB Certified/ minority business as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #

Work Type

\*Minority  
Category

**\*\*HUB**  
Certified  
(Y/N)

[illegible]

\*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**\*\* HUB Certification with the state HUB Office required to be counted toward state participation goals.**

**The total value of minority business contracting will be (\$)**\_\_\_\_\_.

# State of North Carolina AFFIDAVIT A – Listing of Good Faith Efforts

County of \_\_\_\_\_

(Name of Bidder)

Affidavit of \_\_\_\_\_

I have made a good faith effort to comply under the following areas checked:

**Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive.** (1 NC Administrative Code 30 I.0101)

- ☐ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ☐ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- ☐ **3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ☐ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ☐ **5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- ☐ **6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ☐ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ☐ **8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ☐ **9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ☐ **10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

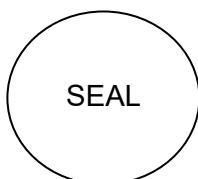
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_

# State of North Carolina --AFFIDAVIT B-- Intent to Perform Contract with Own Workforce.

County of \_\_\_\_\_

Affidavit of \_\_\_\_\_  
(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the \_\_\_\_\_  
\_\_\_\_\_ contract.  
(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

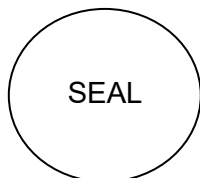
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement. The Bidder agrees to make a Good Faith Effort to utilize minority suppliers where possible.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_

# State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by HUB Certified/Minority Businesses

County of \_\_\_\_\_

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by HUB certified/minority businesses as defined in GS143-128.2(g) and 128.4(a),(b),(e) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit.

This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of \_\_\_\_\_ I do hereby certify that on the  
(Name of Bidder)

(Project Name)  
Project ID# \_\_\_\_\_ Amount of Bid \$ \_\_\_\_\_

I will expend a minimum of \_\_\_\_\_% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below.

Attach additional sheets if required

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

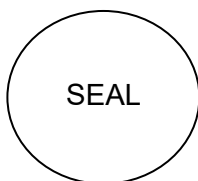
\*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**\*\* HUB Certification with the state HUB Office required to be counted toward state participation goals.**

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_



Signature: \_\_\_\_\_

Title: \_\_\_\_\_

State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_

# State of North Carolina AFFIDAVIT D – Good Faith Efforts

County of \_\_\_\_\_

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by HUB Certified/ minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of \_\_\_\_\_ I do hereby certify that on the \_\_\_\_\_  
(Name of Bidder)

Project ID# \_\_\_\_\_ (Project Name) Amount of Bid \$ \_\_\_\_\_

I will expend a minimum of \_\_\_\_\_% of the total dollar amount of the contract with HUB certified/ minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

\*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**\*\* HUB Certification with the state HUB Office required to be counted toward state participation goals.**

**Examples** of documentation that may be required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

- Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.
- Copies of quotes or responses received from each firm responding to the solicitation.
- A telephone log of follow-up calls to each firm sent a solicitation.
- For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.
- Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.
- Copy of pre-bid roster
- Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.
- Letter detailing reasons for rejection of minority business due to lack of qualification.
- Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

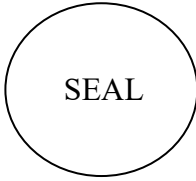
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_



**DOCUMENT 004312**

**PREQUALIFICATION FORMS**

**1.1 PREQUALIFICATION FORMS**

- A. First-tier subcontractors are required to complete the following prequalification forms, bound hereinafter.
  - 1. Part A: CM at Risk 1<sup>st</sup> Tier Subcontractor Master Prequalification Form (Annual Submittal).
  - 2. Part B: CM at Risk 1<sup>st</sup> Tier Subcontractor Prequalification (Project Specific Supplement).
  - 3. Part B, Exhibit 2: Prequalification Ratings Matrix for First-Tier Subcontractors under CM at Risk.

**END OF DOCUMENT**



## Part A: CM at Risk 1<sup>st</sup> Tier Subcontractor Master Prequalification Form (Annual Submittal)

**NOTICE TO ALL SUBCONTRACTORS: All sections of this Part A: Master Prequalification Form (Annual Submittal) must be provided ONCE A YEAR and filled out in its entirety. This form will expire on June 30<sup>th</sup> of each year and requires an update after July 1<sup>st</sup>. If any sections are not complete, then the prequal may be rejected. A separate Part B: Project Specific Supplement is required for each specific project. Part A and Part B will be evaluated together for the specific project.**

### Part A: Master Prequalification (Annual Submittal)

**Submittal Date:** \_\_\_\_\_

**Expiration Date:** \_\_\_\_\_ June 30<sup>th</sup> of each Year

**Submitted to:** \_\_\_\_\_ (Name of CM at Risk firm)

## 1. Main Office Location & Company Contacts

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Physical Address

\_\_\_\_\_  
Mailing Address

\_\_\_\_\_  
City/State Zip Code + 4

(\_\_\_\_\_) \_\_\_\_\_ (\_\_\_\_\_) \_\_\_\_\_  
Phone number Fax number

\_\_\_\_\_  
President/CEO

\_\_\_\_\_  
CFO

\_\_\_\_\_  
Primary Prequalification Contact Name

\_\_\_\_\_  
Primary Prequalification Contact Phone Number

\_\_\_\_\_  
Primary Prequalification Contact Email Address

\_\_\_\_\_  
Company Website

\_\_\_\_\_  
Secondary Prequalification Contact Name

\_\_\_\_\_  
Secondary Prequalification Contact Phone Number

\_\_\_\_\_  
Secondary Prequalification Contact Email Address

## 2. Business Type

(check box) ☐ Corporation ☐ Partnership ☐ Limited Liability Company ☐ Sole Proprietor

Indicate your NC Statewide Uniform Certification: (check box):

☐ MBE ☐ HBE ☐ AABE ☐ AIBE ☐ WBE ☐ SDB ☐ DBE ☐ NONE \_\_\_\_\_ (other)

See website link for more information: <http://www.doa.nc.gov/hub/swuc.htm>

Is your firm registered with the Department of the Secretary of State to conduct business in the State of North Carolina?

☐ Yes ☐ No

Is your firm owned or controlled by a parent or any other organization? ☐ Yes ☐ No

Describe Ownership if Yes: \_\_\_\_\_

## Part A: CM at Risk 1<sup>st</sup> Tier Subcontractor Master Prequalification Form (Annual Submittal)

Confirm that your company can demonstrate compliance with insurance coverages which meet or exceed the minimum requirements of State Construction Manual OC-15 Article 34. ☐ Yes ☐ No

See website link for more information: <https://ncadmin.nc.gov/businesses/construction/forms-documents>

List all other names and years of operation that your firm has operated under for the past five (5) years:

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### 3. Licensing Information

(Please provide all North Carolina professional licenses required for you to perform your services.)

**NC License Type** (check box) ☐ General Construction ☐ Electrical ☐ Mechanical ☐ Plumbing  
☐ Fire Protection ☐ Other (Trade Specific License) \_\_\_\_\_

NC License number/name of licensee	License Limit/Level
_____	_____
_____	_____
_____	_____

Has any license ever been denied or revoked? ☐ Yes ☐ No If yes, please describe why, \_\_\_\_\_

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### 4. Type of Scope Performed, Average project size (in terms of revenue), Largest project size (in terms of revenue)

List all Scopes of Work for which you would request prequalification review in the upcoming year (Bid Packages):

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For Each Scope of Work list the following with values from the last 5 years. (Provide references upon request of the CM)

Scope #1: \_\_\_\_\_ Percentage of Self Performed Work: \_\_\_\_\_

Average project size (\$): \_\_\_\_\_ Largest Project Size (\$): \_\_\_\_\_

Scope #2: \_\_\_\_\_ Percentage of Self Performed Work: \_\_\_\_\_

Average project size (\$): \_\_\_\_\_ Largest Project Size (\$): \_\_\_\_\_

Scope #3: \_\_\_\_\_ Percentage of Self Performed Work: \_\_\_\_\_

Average project size (\$): \_\_\_\_\_ Largest Project Size (\$): \_\_\_\_\_

Scope #4: \_\_\_\_\_ Percentage of Self Performed Work: \_\_\_\_\_

Average project size (\$): \_\_\_\_\_ Largest Project Size (\$): \_\_\_\_\_

Scope #5: \_\_\_\_\_ Percentage of Self Performed Work: \_\_\_\_\_

Average project size (\$): \_\_\_\_\_ Largest Project Size (\$): \_\_\_\_\_

Scope #6: \_\_\_\_\_ Percentage of Self Performed Work: \_\_\_\_\_

Average project size (\$): \_\_\_\_\_ Largest Project Size (\$): \_\_\_\_\_

## Part A: CM at Risk 1<sup>st</sup> Tier Subcontractor Master Prequalification Form (Annual Submittal)

Indicate your two **largest** completed projects in the last 5 Years per scope. If submitting for multiple scopes, submit multiple sheets.

<b>#1 –Completed - Project Name</b>	
Description of Work Performed	
Contract Delivery Method (CMAR or GC?)	
Owner Name/ Representative	
Architect Name/Representative	
GC or CM Name/Representative	
GC or CM Address/Phone #/Email	
Lost Man-hours due to Accident	
Final Contract Dollar Value	
HUB % Achieved (on Contract Value)	
Date Complete	

<b>#2 –Completed - Project Name</b>	
Description of Work Performed	
Contract Delivery Method (CMAR or GC?)	
Owner Name/ Representative	
Architect Name/Representative	
GC or CM Name/Representative	
GC or CM Address/Phone #/Email	
Lost Man-hours due to Accident	
Final Contract Dollar Value	
HUB % Achieved (on Contract Value)	
Date Complete	

## Part A: CM at Risk 1<sup>st</sup> Tier Subcontractor Master Prequalification Form (Annual Submittal)

### 5. Size of Company

List the annual dollar value of billings the company has performed for each year over the last (5) five fiscal years (most recent Y/E listed first).

Year #1 (20\_\_\_\_) - \$\_\_\_\_\_

Year #2 (20\_\_\_\_) - \$\_\_\_\_\_

Year #3 (20\_\_\_\_) - \$\_\_\_\_\_

Year #4 (20\_\_\_\_) - \$\_\_\_\_\_

Year #5 (20\_\_\_\_) - \$\_\_\_\_\_

### 6. Current Workload

Number of active projects that your company is presently working on - \_\_\_\_\_

Remaining revenue to earn (backlog) on active projects - \_\_\_\_\_

### 7. Safety

List your company's Experience Modification Rate (EMR) for past five years. Refer to Supplemental information, Item 4 for Insurance Carrier letter supporting Present Rate EMR.

_____ Present Rate	_____ Last Rate	_____ Year before rate	_____ Year before rate	_____ Year before rate
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If any year your rate is over 1.00 please explain why:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

List your company's Recordable Incident Rate (RIR) for past five years:

_____ Present Rate	_____ Last Rate	_____ Year before rate	_____ Year before rate	_____ Year before rate
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List your company's Days Away Restricted or Transferred Rate (DART) for past five years:

_____ Present Rate	_____ Last Rate	_____ Year before rate	_____ Year before rate	_____ Year before rate
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List any OSHA fines and Jobsite fatalities in the past five (5) years. Please attach OSHA report describing the incident:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Does your company have a dedicated safety individual who inspects job sites on a regular base? If yes, please provide name and contact information for this individual:

## Part A: CM at Risk 1<sup>st</sup> Tier Subcontractor Master Prequalification Form (Annual Submittal)

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Does your company have a Written Safety Program and Plan in compliance with current OSHA requirements for your scopes of work (Y/N): \_\_\_\_\_

Does your company provide weekly training to your on-site employees (Y/N): \_\_\_\_\_

Does your company perform weekly safety inspections on the jobsite? (Y/N): \_\_\_\_\_

### 8. Litigation, Claims, Criminal Convictions & Administrative Actions

Has your company filed any claims against a CM at Risk or General Contractor within the last five years, whether resolved or still pending resolution? ☐ Yes ☐ No If yes, state the project name(s), year(s), and reason why: \_\_\_\_\_

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Has your company been involved in any judgments, arbitration or mediation proceedings, or suits within the last five years, whether resolved or still pending resolution? ☐ Yes ☐ No If yes, state the project name(s), year(s), case number and reason why: \_\_\_\_\_

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Has your company ever failed to complete work awarded to it or has your company's work been supplemented by a CMAR or GC? ☐ Yes ☐ No If yes, please provide project name(s), year(s), and reason why: \_\_\_\_\_

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Have you ever paid liquidated damages on any project? ☐ Yes ☐ No If yes, state the project name(s), year(s), and reason why. \_\_\_\_\_

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Has your bonding company had to take any of the following actions in the last 10 years: Project technical support, Payments to vendors, Supplement work on a contract, or complete a contract for your company? ☐ Yes ☐ No If yes, state the project name(s), year(s), and reason why.

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Has a Bid Bond ever been collected upon on a project your company bid in the last 5 years? ☐ Yes ☐ No If yes, state the project name(s), year(s), and reason why.

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Has your present company, its officers, owners, or agents ever been convicted of charges relating to conflicts of interest, bribery, or bid-rigging? ☐ Yes ☐ No If yes, state the project name(s), year(s), and reason why.

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## Part A: CM at Risk 1<sup>st</sup> Tier Subcontractor Master Prequalification Form (Annual Submittal)

Has your present company, its officers, owners, or agents ever been barred from bidding public work in North Carolina?

☐ Yes ☐ No If yes, state the project name(s), year(s), case number and reason why.

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### 9. Historically Underutilized Business (HUB) Plan

Does the company currently have a documented plan for engaging subcontractor participation from Historically Underutilized Businesses? ☐ Yes ☐ No If yes, please attach your company's HUB plan.

### 10. Signature

By signing this document, you are acknowledging that all answers are true to the best of your knowledge. **Any answers found to be falsified will ban you from being prequalified for projects.**

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Signature

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Date

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Printed Name and Title

**Required Supplementary Information that needs to be included at the same time the prequalification form (Part A) is submitted.**

- 1) Your most recent CPA audited or reviewed financial statements.
- 2) Bonding Letter from your Surety Company listing single and aggregate bonding limits and what bonding capacity that is available.
- 3) A current Certificate of Insurance listing all insurance policies.
- 4) Letter from Insurance carrier stating last five years of EMR ratings.
- 5) The last five years of your OSHA 300A report
- 6) Copy of HUB Certification (if Applicable)
- 7) Copy of Professional Licenses (If Applicable)

**Note:**



**Part A: CM at Risk 1<sup>st</sup> Tier Subcontractor Master Prequalification Form (Annual Submittal)**

***All pieces of supplementary information shall be provided. If they are not, then the prequal is deemed incomplete and may be rejected. If for some reason you are unable to provide one of the items listed above please explain below.***

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## Part B: CM at Risk 1<sup>st</sup> Tier Subcontractor Prequalification (Project Specific Supplement)

**NOTICE TO ALL SUBCONTRACTORS: This Part B may be used as a project specific "short form" supplement to the prequalification process, ONLY IF, said Subcontractor has submitted to the CMAR a "Complete" Master Prequalification Package Part A during the July 1 to June 30 fiscal year period of the project specific prequal advertisement**

Subcontractor hereby agrees that the "complete" Master prequal Part A submitted to the CMAR dated \_\_\_/\_\_\_/20\_\_\_ remains in good standing for the overall accuracy of the subcontractor for the fiscal period. ☐ Yes ☐ No If no, explain the material changes to safety, leadership or ownership, company size, licenses, type of work performed, financials, bonding, insurances, litigation, etc.:

(if changes are substantial to complete evaluate prequal, the CMAR may require Subcontractor to submit an updated Master Prequal and reject this supplement)

### 1. Information

1.a. Name of Project Advertised: \_\_\_\_\_

1.b. Subcontractor Full Company Name: \_\_\_\_\_

1.b.1 Primary Contact Full Name: \_\_\_\_\_

1.b.2 Primary Contact Phone No.: \_\_\_\_\_ Cell No.: \_\_\_\_\_

1.b.3 Primary Contact email Address: \_\_\_\_\_

1.c. Check the Boxes on the Attached Exhibit 1 (Listing of Bid Packages) to indicate which Bid Packages this Subcontractor is requesting to Prequalify for on this Project and return with Prequalification Part B.

1.d. Does Subcontractor intend to Partner or Joint Venture with another Subcontractor for this Project: ☐ Yes ☐ No

If yes, list the Companies involved and their applicable participating percentage: \_\_\_\_\_

### 2. Updated Company Information (from Part A; Master Prequalification Form)

2. a. Update your Current Backlog \$ \_\_\_\_\_ (unearned revenue as of date of this supplement)

2. b. Attach updated Bonding letter from your Surety if anticipated Bid Package will exceed \$300,000. Letter shall be dated within the last 30 days. Have you attached a surety letter? ☐ Yes ☐ No

2.c. Attach a list to Part B of all the Projects working with the CM at Risk of the Project in the last 5 years

### 3. Project Specifics

3.a. The assigned project superintendent for this project shall be: \_\_\_\_\_.

Include a resume. Have you included a resume? ☐ Yes ☐ No

3.b. Experience of the superintendent on this specific type of project is: \_\_\_ 0-2 \_\_\_ 3-4 \_\_\_ 5-10 \_\_\_ >10 years.

3.c. The assigned project manager for this project shall be \_\_\_\_\_.

Include a resume. Have you included a resume? ☐ Yes ☐ No

3.d. Experience of the project manager on this specific type of project is: \_\_\_ 0-2 \_\_\_ 3-4 \_\_\_ 5-10 \_\_\_ >10 years.

3.e. List three (3) current or completed projects of similar type which most closely reflects the size and complexity of the type of work being requested for the currently proposed project within the last 5 years.

#1 –Similar Project Name (Size / Scope / over 50% Completed)	
Description of Work Performed	
Completion Date (or expected)	
Owner Name/ Representative	
Owner Address/Phone #/Email	
Architect Name/Representative	
Architect Address/Phone #/Email	
GC or CM Name/Representative	
GC or CM Address/Phone #/Email	
Contract Dollar Value	
Percentage Complete	
HUB Percentage Achieved	

## Part B: CM at Risk 1<sup>st</sup> Tier Subcontractor Prequalification (Project Specific Supplement)

<b>#2 –Similar Project Name (Size / Scope / over 50% Completed)</b>	
Description of Work Performed	
Completion Date (or expected)	
Owner Name/ Representative	
Owner Address/Phone #/Email	
Architect Name/Representative	
Architect Address/Phone #/Email	
GC or CM Name/Representative	
GC or CM Address/Phone #/Email	
Contract Dollar Value	
Percentage Complete	
HUB Percentage Achieved	
<b>#3 –Similar Project Name (Size / Scope / over 50% Completed)</b>	
Description of Work Performed	
Completion Date (or expected)	
Owner Name/ Representative	
Owner Address/Phone #/Email	
Architect Name/Representative	
Architect Address/Phone #/Email	
GC or CM Name/Representative	
GC or CM Address/Phone #/Email	
Contract Dollar Value	
Percentage Complete	
HUB Percentage Achieved	

### 3.f. Labor Resources for this project

3.f.1 What is total number of craft employees does Subcontractor employee for Bid Packages requesting:

3.f.1.a = supervisors and foreman = \_\_\_\_\_ each

3.f.1.b = skilled tradesman = \_\_\_\_\_ each

3.f.1.3 = unskilled tradesman = \_\_\_\_\_ each

3.f.2 What is percentage of anticipated self perform work with own forces vs. subcontracting to lower tiers:

\_\_\_\_\_% self perform with inhouse labor; \_\_\_\_% to outsource ready labor; \_\_\_\_% lower tier subcontract;

## 4. Signatures

By signing this document, you are acknowledging that all answers are true to the best of your knowledge. **Any answers found to be falsified will bar you from being prequalified on this project.**

Dated this day of: \_\_\_\_\_

Submitted by: \_\_\_\_\_

Signature By Authorized Officer

Print Title of Authorized Officer

## 5. Scoring Matrix for Part A plus Part B

See Exhibit 2; CM at Risk Subcontractor scoring Matrix

**Part B: CM at Risk 1<sup>st</sup> Tier Subcontractor Prequalification (Project Specific Supplement)**

Exhibit 1  
List of Proposed Bid Packages

Name of Project: \_\_\_\_\_  
Total Project Value: \_\_\_\_\_  
Anticipated Project Start Date: \_\_\_\_\_  
Anticipated Project Completion Date: \_\_\_\_\_

Check Box Seeking Prequal	Bid Package Number	Bid Package Description	Bid Package Estimated Value
<hr/>			



**Part B - Exhibit 2**  
**Prequalification Ratings Matrix for First-Tier Subcontractors under CM @ Risk**

Name of Subcontractor: \_\_\_\_\_

Project Name: \_\_\_\_\_

Bid Package No. / Description: \_\_\_\_\_

			1	2	3	4	5	6	7	8
Part A Section #	Description	Yes or No	Pts	Pts	Pts	Pts	Pts	Pts	Pts	Pts
Part A - 1. GENERAL COMPANY INFORMATION		Yes or No								
Part A - 2. BUSINESS TYPE		Yes or No								
Part A - 3. LICENSING INFORMATION		Yes or No								
Part A - 4. TYPE OF SCOPE OF WORK / AVERAGE SIZE / LARGEST PROJECT		Yes or No								
Part A - 5. SIZE OF COMPANY		Yes or No								
Part A - 6. CURRENT WORKLOAD		Yes or No								
Part A - 7. CURRENT WORKLOAD		Yes or No								
Part A - 8. LITIGATIONS AND CLAIMS		Yes or No								
Part A - 9. HUB OR DIVERSITY PLAN										
Part A - SUPPLEMENTAL INFORMATION										
	Audited Financials	Yes or No								
	Bonding Company Letter	Yes or No								
	Current Insurance Certificate meeting OC-15 Article 34	Yes or No								
	Letter from Insurance Company stating EMR	Yes or No								
	OSHA 300 Reports	Yes or No								
	Copy of HUB Certification, if claimed in Section 2	Yes or No								
	Copy of Licenses for Specific work, if required in Section 3	Yes or No								
Part A Acceptance = Subtotal 15 out of 15 points										
Part B Section #	Description	Yes or No	Pts	Pts	Pts	Pts	Pts	Pts	Pts	Pts
Part B - 1. INFORMATION										
Part B - 2. UPDATED COMPANY INFORMATION										
	2a Current Backlog and Bonding Capacity Available	Yes or No								
	2b Attach bonding letter from Surety, if over \$300k	Yes or No								
	2c List of Projects working with CMAR in last 5 years	Yes or No								
Part B - 3. PROJECT SPECIFICS										
	3a Assigned Superintendent resume and experience	Yes or No								
	3b Relevant project experience of assigned Superintendent	Yes or No								
	3c Assigned Project Manager resume and experience	Yes or No								
	3d Relevant project experience of assigned Project Manager	Yes or No								
	3e Related Project Experience	Yes or No								
	3f.1 Available Craftsman for Trade Prequalifying for	Yes or No								
	3f.1 Self performance for Trade Prequalifying for	Yes or No								
Part B Acceptance = Subtotal 10 out of 10 points										
TOTAL POINTS = 25 points out of 25 points										
			All scores of 25 points will be prequalified.							

note; if an item is not applicable ("n/a"), then the CMAR shall make the line "n/a" for all subcontractors seeking prequalification for that bid package





**DOCUMENT 004313 - BID BOND FORM**

**1.1 BID BOND FORM**

- A. A completed bid bond form is required to be attached to the Bid Form. The bid bond form is bound hereinafter.

**END OF DOCUMENT**



## FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS THAT \_\_\_\_\_

\_\_\_\_\_ as  
principal, and \_\_\_\_\_, as surety, who is  
duly licensed to act as surety in North Carolina, are held and firmly bound unto the  
Trustees of Durham Tech Community College through  
\_\_\_\_\_ as obligee, in the penal sum of  
\_\_\_\_\_ DOLLARS, lawful money of the United States of  
America, for the payment of which, well and truly to be made, we bind ourselves, our heirs,  
executors, administrators, successors and assigns, jointly and severally, firmly by these  
presents.

Signed, sealed and dated this \_\_\_\_ day of \_\_\_\_ 20\_\_

WHEREAS, the said principal is herewith submitting proposal for  
and the principal desires to file this bid bond in lieu of making  
the cash deposit as required by G.S. 143-129.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION is such, that  
if the principal shall be awarded the contract for which the bid is submitted and shall  
execute the contract and give bond for the faithful performance thereof within ten days after  
the award of same to the principal, then this obligation shall be null and void; but if the  
principal fails to so execute such contract and give performance bond as required by G.S.  
143-129, the surety shall, upon demand, forthwith pay to the obligee the amount set forth in  
the first paragraph hereof. Provided further, that the bid may be withdrawn as provided by  
G.S. 143-129.1

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)



**DOCUMENT 005200**

**FORM OF CONSTRUCTION CONTRACT**

**1.1 APPLICABLE DOCUMENTS**

- A. Appendix C Form of Contract – Fixed Guaranteed Maximum Price "Form of Construction Manager at Risk Contract Fixed Guaranteed Maximum Price" shall be executed by the Contractor with the Owner, is part of the Contract Documents.
- B. A sample of the form of construction contract is bound herein.

**END OF DOCUMENT**



## **APPENDIX C**

### **FORM OF CONTRACT – FIXED GUARANTEED MAXIMUM PRICE**

# FORM OF CONSTRUCTION MANAGER AT RISK CONTRACT FIXED GUARANTEED MAXIMUM PRICE

State Construction File Number:

THIS AGREEMENT, made this \_\_\_\_\_ day of \_\_\_\_\_ in the year of \_\_\_\_\_

for \_\_\_\_\_  
(Title of Project)

by and between \_\_\_\_\_

hereinafter called the Construction Manager at Risk, and the State of North Carolina, through

hereinafter called the Owner.

## WITNESSETH:

Whereas the Owner has published a Request for Proposals seeking the submission of competitive proposals to act as a Construction Manager at Risk to furnish professional construction management services during the design and construction of the Project identified and described in that Request for Proposals; and,

Whereas, the undersigned Construction Manager at Risk submitted a competitive proposal that was evaluated by the Owner; and,

Whereas, the Owner, through its awarding authority, has made an award of the work to the undersigned Construction Manager at Risk, and pursuant to the terms of the Request for Proposals this form is to be executed to form and memorialize the contractual relationship between the parties;

Now therefore, the Construction Manager at Risk and the Owner agree as follows:

1. This form of contract hereby shall be incorporated and accompanied by; Owner's letter for recommendation of award dated \_\_\_\_\_, Owner's Request for Proposal dated \_\_\_\_\_, Construction Manager at Risk's response to proposal dated \_\_\_\_\_, Construction Manager at Risk's HUB plan approved by Owner dated \_\_\_\_\_, Designer's drawing and specification lists dated \_\_\_\_\_, Construction Manager at Risk's payment and performance bonds dated \_\_\_\_\_, Power of Attorney, Construction Manager at Risk's Insurance Certificate dated \_\_\_\_\_, Statement of GMP including schedule of values for cost of the work and General Conditions dated \_\_\_\_\_



\_\_\_\_\_, and incorporated herein by reference the contract for Pre-Construction Services dated \_\_\_\_\_.

2. For the sums set forth in the Construction Manager at Risk's fee proposal (or any subsequently amended fee agreement), the Construction Manager at Risk undertakes to act as the Owner's fiduciary (N.C.G.S.143-128.1) and to furnish professional construction management services during the construction of the Project.
3. The providing of the Construction Manager at Risk services shall be in compliance with the requirements of the Request for Proposal (including all its appendices and attachments) and the Construction Manager at Risk's proposal (Hereinafter, together: the Contract Documents). To the extent that any term, requirement, or specification in the Construction Manager at Risk's proposal shall be in conflict with the Request for Proposal, the terms, requirements, and specifications of the Request for Proposal shall control and the conflicting contents of the Construction Manager at Risk's proposal shall be deemed surplusage except where provided otherwise.
4. That the Construction Manager at Risk shall commence provision of construction phase services under this agreement on a date to be specified in a written order of the Owner and shall fully complete all services hereunder and accomplish the final completion of the project within \_\_\_\_\_ consecutive calendar days from the date of Notice to Proceed. The Construction Manager at Risk shall furnish to the Owner various schedules as provided in the Contract Documents setting forth planned progress of the project broken down by the various divisions or part of the work and by calendar days. If the Construction Manager at Risk fails to begin the work under the contract within the time specified, or the progress of the work is not maintained on schedule, or the work is not completed within the time above specified, or shall allow the work to be performed unsuitably or shall discontinue the prosecution of the work, or if the Construction Manager at Risk shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the work in an acceptable manner, the Owner may give notice in writing, sent by certified mail, return receipt requested, to the Construction Manager at Risk and his surety of such delay, neglect or default, specifying the same, and if the Construction Manager at Risk within a period of seven (7) days after such notice shall not proceed in accordance therewith, then the Owner shall, declare this contract in default, and, thereupon, the surety shall promptly take over the work and complete the performance of this contract in the manner and within the time frame specified. In the event the surety shall fail to take over the work to be done under this contract within seven (7) days after being so notified and notify the Owner in writing, sent by certified mail, return receipt requested, that he is taking the same over and stating that he will diligently pursue and complete the same, the Owner shall have full power and authority, without violating the contract, to take the prosecution of the work out of the hands of said Construction Manager at Risk, to appropriate or use any or all contract materials and equipment on the grounds as may be suitable and acceptable and may enter into an agreement, either by public letting or negotiation, for the completion of said contract according to the terms and provisions thereof or use such other methods as in his opinion shall be required for the completion of said contract in an acceptable manner. All costs and charges incurred by the Owner, together with the costs of completing the work under contract, shall be deducted from any monies due or which may become due said Construction Manager at Risk and surety. In case the expense so

incurred by the Owner shall be less than the sum which would have been payable under the contract, if it had been completed by said Construction Manager at Risk, then the said Construction Manager at Risk and surety shall be entitled to receive the difference, but in case such expense shall exceed the sum which would have been payable under the contract, then the Construction Manager at Risk and the surety shall be liable and shall pay to the Owner the amount of said excess.

5. It is further mutually agreed between the parties hereto that if at any time after the execution of this agreement and the surety bonds hereto attached for its faithful performance, the Owner shall deem the surety or sureties upon such bonds to be unsatisfactory, or if, for any reason, such bonds cease to be adequate to cover the performance of the work, the Construction Manager at Risk shall, at its expense, within five (5) days after the receipt of notice from the Owner so to do, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the Owner. In such event no further payment to the Construction Manager at Risk shall be deemed to be due under this agreement until such new or additional security for the faithful performance of the work shall be furnished in manner and form satisfactory to the Owner.

6. Fixed Guaranteed Maximum Price

Cost of the Work	\$
Construction Management Fee	\$
Construction Manager's Bonds and Insurance	\$
Construction Manager's Construction Contingency	\$ _____
<b>Total Fixed Guaranteed Maximum Price</b>	<b>\$</b>

IN WITNESS WHEREOF, the Parties hereto have executed this agreement on the day and date first above written in four (4) counterparts, each of which shall without proof or accounting for other counterparts, be deemed an original contract.

Witness: (Proprietorship or Partnership)

Construction Manager at Risk:

\_\_\_\_\_  
(Trade or Corporate Name)

\_\_\_\_\_  
By: \_\_\_\_\_

Attest: (Corporation)

Title: \_\_\_\_\_  
(Owner, Partner, or Corp. Pres. or Vice  
Pres. only)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corporate Sec. or Asst. Sec. only)

(CORPORATE SEAL)

The State of North Carolina through

Witness:

\_\_\_\_\_  
(Agency, Department or Institution)

By: \_\_\_\_\_

Title: \_\_\_\_\_



## **DOCUMENT 006000 - PROJECT FORMS**

### **1.1 ADMINISTRATIVE FORMS**

- A. The Form of Performance Bond is bound hereinafter.
- B. The Form of Payment Bond is bound hereinafter.
- C. The Sheet for Attaching Power of Attorney is bound hereinafter.
- D. The Sheet for Attaching Insurance Certificates is bound hereinafter.
- E. The sheet for Approval of the Attorney General is bound hereinafter.
- F. The Certification by the Office of State Budget and Management is bound hereinafter.

**END OF DOCUMENT**



## FORM OF PERFORMANCE BOND

Date of Contract: \_\_\_\_\_

Date of Execution: \_\_\_\_\_

Name of Principal  
(Contractor) \_\_\_\_\_

Name of Surety: \_\_\_\_\_

Name of Contracting  
Body: \_\_\_\_\_

Amount of Bond: \_\_\_\_\_

Project Life Sciences Building, Durham Tech Community College

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind, ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body, identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the contracting body, with or without notice to the surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in \_\_\_\_\_ counterparts.

Witness:

\_\_\_\_\_  
(Proprietorship or Partnership)

Attest: (Corporation)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corp. Sec. or Asst. Sec. only)

(Corporate Seal)

Witness:

\_\_\_\_\_

Countersigned:

\_\_\_\_\_

\_\_\_\_\_  
(N.C. Licensed Resident Agent)

\_\_\_\_\_

\_\_\_\_\_  
Name and Address-Surety Agency

\_\_\_\_\_

\_\_\_\_\_  
Surety Company Name and N.C.  
Regional or Branch Office Address

\_\_\_\_\_  
Contractor: (Trade or Corporate Name)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Owner, Partner, or Corp. Pres. or Vice  
Pres. only)

\_\_\_\_\_  
(Surety Company)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Attorney in Fact)

(Surety Corporate Seal)



## FORM OF PAYMENT BOND

Date of Contract: \_\_\_\_\_

Date of Execution: \_\_\_\_\_

Name of Principal  
(Contractor) \_\_\_\_\_

Name of Surety: \_\_\_\_\_

Name of Contracting  
Body: \_\_\_\_\_

Amount of Bond: \_\_\_\_\_

Project Life Sciences Building, Durham Tech Community College

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall promptly make payment to all persons supplying labor/material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in \_\_\_\_\_ counterparts.

Witness:

\_\_\_\_\_  
(Proprietorship or Partnership)

Attest: (Corporation)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corp. Sec. or Asst. Sec.. only)

(Corporate Seal)

Witness:

\_\_\_\_\_

Countersigned:

\_\_\_\_\_

\_\_\_\_\_  
(N.C. Licensed Resident Agent)

\_\_\_\_\_

\_\_\_\_\_  
Name and Address-Surety Agency

\_\_\_\_\_

\_\_\_\_\_  
Surety Company Name and N.C.  
Regional or Branch Office Address

\_\_\_\_\_  
Contractor: (Trade or Corporate Name)

By: \_\_\_\_\_

Title \_\_\_\_\_  
(Owner, Partner, or Corp. Pres. or Vice  
Pres. only)

\_\_\_\_\_  
(Surety Company)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Attorney in Fact)

(Surety Corporate Seal)

## Sheet for Attaching Power of Attorney

## Sheet for Attaching Insurance Certificates

## APPROVAL OF THE ATTORNEY GENERAL

**CERTIFICATION BY THE OFFICE OF STATE  
BUDGET AND MANAGEMENT**

Provision for the payment of money to fall due and payable by the

---

under this agreement has been provided for by allocation made and is available for the purpose of carrying out this agreement.

This \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_.

Signed \_\_\_\_\_  
Budget Officer

## **SECTION 011000**

### **SUMMARY**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

A. Section Includes:

1. Project Information.
2. Work performed by Owner.
3. Work under Owner's separate contracts.
4. Future work.
5. Owner-furnished/Owner-installed (OFOI) products.
6. Work restrictions.
7. Coordination with occupants.
8. Contractor's use of site and premises.
9. Specification and Drawing conventions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

##### **1.2 PROJECT INFORMATION**

A. The Work comprises the construction and services required by the Contract Document for the following Project:

1. Project Name: Durham Tech Community College Life Sciences Building.
2. Project Address: 1650 E. Lawson St., Durham, NC 27703.
3. Project SCO ID: 23-26245-02A.
4. Project NCCCS ID: 2731.

B. Owner: When the term "Owner" is used in the Contract Documents it is understood to mean Trustees of Durham Tech Community College, or its authorized representative.

1. Owner Representative: Susan Bowen, Ed. D.
2. Owner Address: 1637 E. Lawson Street, Durham, NC 27704.

C. Architect: When the term "Architect" is used in the Contract Documents it is understood to mean Andre Johnson Architect, PLLC, or its authorized representative.

D. Construction Manager: When the term "Construction Manager" is used in the Contract Documents it is understood to mean Skanska, or its authorized representative.

1. Construction Manager is the Project's constructor. The terms "Construction Manager" and "Construction Manager at Risk" and "Contractor" are synonymous when used in the Contract Documents.

### **1.3 WORK PERFORMED BY OWNER**

- A. Cooperate fully with Owner, so work performed by Owner may be carried out smoothly, without interfering with or delaying Work under this Contract or work performed by Owner. Coordinate the Work of this Contract with work performed by Owner.
  1. Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreed upon timetable. Notify Owner if changes to schedule are required due to Contractor's actual construction progress.
  2. Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.
- B. Preceding Work: Owner will award or has awarded a contract to perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before Work under this Contract begins.
  1. Structure demolition of Building 8 at Project site, limited to demolition of above-grade structure.
    - a. Demolition of existing below-grade foundations, existing slab-on-grade, existing below-grade utilities, and existing site improvements is not part of the preceding work. Drawings indicate extent of selective demolition and site clearing required as part of the Work of this Project.
- C. Subsequent Work: Owner will perform the following additional work at Project site after Substantial Completion. Completion of work performed by Owner will depend on successful completion of preparatory Work under this Contract.
  1. Installation of Owner-Furnished/Owner-Installed Products.

### **1.4 WORK UNDER OWNER'S SEPARATE CONTRACTS**

- A. Work with Owner's Separate Contractors: Cooperate fully with Owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.
  1. Include Owner's separate contractors at preinstallation conferences covering portions of the Work that will impact separate contractors. Attend preinstallation conferences conducted by Owner's separate contractors if portions of the Work depend on work on those contracts.
    - a.



## **1.5 FUTURE WORK**

- A. Future Work Not Part of this Contract: The Contract Documents include requirements that will allow Owner to carry out future work following completion of this Project; provide for the following future work:
  - 1. Future Phase 2 Health Sciences Building.

## **1.6 OWNER-FURNISHED/OWNER-INSTALLED (OFOI) PRODUCTS**

- A. The Owner will furnish and install products indicated.
- B. Owner-Furnished/Owner-Installed (OFOI) Products:
  - 1. Exterior Signage indicated as OFOI.
  - 2. Appliances indicated as OFOI.
  - 3. Lab equipment indicated as OFOI.
  - 4. Vending Machines.
  - 5. Loose furniture.

## **1.7 WORK RESTRICTIONS**

- A. Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between **<Insert time>** a.m. to **<Insert time>** p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
  - 1. Weekend Hours: **<Insert restrictions on times permitted for weekend work>**.
  - 2. Early Morning Hours: **<Insert restrictions for restrictions on noisy work>**.
  - 3. Hours for Utility Shutdowns: **<Insert Owner's restrictions>**.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
  - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to occupants of adjacent buildings.
  - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
  - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Project site is not permitted.

- F. Firearm Restrictions: No firearms of any type are permitted on the Project site.

## **1.8 COORDINATION WITH OCCUPANTS**

- A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
  2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
  3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
  4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

## **1.9 CONTRACTOR'S USE OF SITE AND PREMISES**

- A. Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Limits on Use of Site: Confine construction operations to Phase 1 Project Limits indicated on Drawings.
  2. Driveways, Walkways and Entrances: Keep driveways, loading areas, parking areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
  3. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Site Access: Limited to locations indicated on Drawings.
1. Allow access to Project site for Owner's separate contractors and Owner's construction personnel.
- C. Material and Equipment Storage: Maintain material and equipment storage areas in a neat and orderly fashion acceptable to Owner and Architect.

## **1.10 SPECIFICATION AND DRAWING CONVENTIONS**

- A. Specification Format: The Specifications are organized into Divisions and Sections using the Construction Specifications Institute (CSI) MasterFormat numbering system.
  - 1. Sections in the Project Manual are in numeric sequence. However, the sequence is incomplete. Refer to Document 000110 "Table of Contents" to determine the numbers and names of Sections in the Contract Documents.
  - 2. Requirements of Sections in Division 01 "General Requirements" apply to the Work of all Sections in the Specifications.
- B. Specification Conventions: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- C. Drawing Conventions: One or more of the following conventions are used on Drawings to identify materials and products:
  - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  - 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.

## **PART 2 - PRODUCTS**

**NOT USED**

## **PART 3 - EXECUTION**

**NOT USED**

**END OF SECTION**



## **SECTION 012300**

### **ALTERNATES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Administrative and procedural requirements for alternates.
  - 2. Schedule of alternates.

##### **1.2 DEFINITIONS**

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

##### **1.3 PROCEDURES**

- A. Submit bids on Document 004113 "Bid Form" for each alternate listed in this Section.
  - 1. The amount of each alternate shall be stated in the dollar amount to be added or deducted from the Base Bid, or no change in cost, as the case may be, in the event the Owner elects to accept the alternate.
- B. Reference to Project Manual Section numbers and Drawing sheet numbers in the description of an alternate shall be used as a guide only. Bidder is responsible for determining the Work affected by each individual alternate.
- C. Coordination: Revise or adjust affected adjacent Work as necessary to completely integrate Work of the alternate into Project.
  - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.
- D. Execute accepted alternates under the same conditions as other Work of the Contract.

#### **1.4 CHANGES TO CONTRACT SUM AND CONTRACT TIME**

- A. Alternate prices are all inclusive, including labor, material, supervision, tools, equipment, applicable taxes, overhead, profit, and other items necessary for the completion of the Work associated with each alternate.
- B. Owner reserves the right to reject all alternate or to accept any alternate in any order or combination, and to determine the low bidder for each classification of Work on the basis of the sum of the Base Bid and the accepted alternates.
- C. Alternate prices shall be submitted under a condition of irrevocability for the entire Contract Time.
- D. Accepted alternates will be identified in the Owner-Contractor agreement.

### **PART 2 - PRODUCTS**

#### **NOT USED**

### **PART 3 - EXECUTION**

#### **3.1 SCHEDULE OF ALTERNATES**

- A. Alternate No. G1 – Parapet Height:
  - 1. Base Bid: Provide 2 foot 10 inch parapet height as indicated on Drawings.
  - 2. Alternate: Provide 5 foot 10 inch parapet height as indicated on Drawings.
- B. Alternate No. G2 – Landscaping:
  - 1. Base Bid: Provide code-required landscaping as indicated on Drawings.
  - 2. Alternate: Provide full landscaping as indicated on Drawings.
- C. Alternate No. G3 – Storefront to Curtainwall:
  - 1. Base Bid: At radius corners of building, provide glazed aluminum storefront system as indicated on Drawings and as specified in Section 084113 "Aluminum Framed Entrances and Storefront."
  - 2. Alternate: At radius corners of building, provide glazed aluminum curtain wall system as indicated on Drawings and as specified in Section 084413 "Glazed Aluminum Curtain Walls."
- D. Alternate No. G4 – Landscaping Maintenance:
  - 1. Base Bid: Provide no maintenance of landscaping.
  - 2. Alternate: Provide maintenance of landscaping.

E. Alternate No. G5 – Paint to Acoustic Wall Panels:

1. Base Bid: Provide painting on walls in Rooms 101, 110B, 110C, 112B, and 112C, as indicated on Drawings.
2. Alternate: Provide painting and acoustic wall panels on walls in Rooms 101, 110B, 110C, 112B, and 112C, as indicated on Drawings.

F. Alternate No. G6 – Laboratory Equipment:

1. Base Bid: Lab equipment is Owner-Furnished/Contractor-Installed. Lab equipment affected by this alternate includes (3) biosafety cabinets, (6) fume hoods, (1) autoclave, (1) parts washer, and (2) glassware washers.
2. Alternate: Lab equipment is Contractor-Furnished/Contractor-Installed. Lab equipment includes (3) biosafety cabinets, (6) fume hoods, (1) autoclave, (1) parts washer, and (2) glassware washers.

G. Alternate No. G7 – Study Nodes Surrounds:

1. Base Bid: Provide painted gypsum wall at study nodes surrounds, as indicated on Drawings.
2. Alternate: Provide wood surround (WD-2) at study nodes, as indicated on Drawings.

H. Alternate No. G8 – Roller Shades:

1. Base Bid: Provide manually-operated roller shades in Rooms 111, 119, 204, and 213, as indicated on Drawings and specified in Section 122413 "Roller Window Shades."
2. Alternate: Provide electric-motor-operated roller shades in Rooms 111, 119, 204, and 213, as indicated on Drawings and specified in Section 122413 "Roller Window Shades."

I. Alternate No. G9 – Breezeway Benches:

1. Base Bid: Provide decorative gravel and plantings in lieu of breezeway benches, as indicated on Drawings.
2. Alternate: Provide breezeway benches constructed of concrete, composite decking, and plantings, as indicated on Drawings and as specified in Section 033300 "Architectural Concrete" and Section 067300 "Composite Decking."

J. Alternate No. G10 – Vacuum Pumps and Piping:

1. Base Bid: Provide no vacuum pumps or piping as indicated on Drawings.
2. Alternate: Provide vacuum pumps and piping as indicated on Drawings.

K. Alternate No. G11 – Security Devices:

1. Base Bid: Security devices are Owner-Furnished/Owner-Installed. Security devices affected by this alternate include (17) cameras, (27) glass break detectors, and (28) card readers.
2. Alternate: Security devices are Contractor-Furnished/Contractor-Installed. Security devices affected by this alternate include (17) cameras, (27) glass break detectors, and (28) card readers.

L. Alternate No. G12 – Audio-Visual Equipment:

1. Base Bid: Projectors, projection screens, and monitors are Owner-Furnished/Owner-Installed.
2. Alternate: Projectors, projection screens, and monitors are Contractor-Furnished/Contractor-Installed.

M. Alternate No. G13 – Metal Laboratory Tables:

1. Base Bid: All type “T” metal tables in laboratories are Owner-Furnished/Owner-Installed.
2. Alternate: All type “T” metal tables in laboratories are Contractor-Furnished/Contractor-Installed.

N. Alternate No. G14 – Corridor Seating:

1. Base Bid: Corridor seating is Owner-Furnished/Owner-Installed, as indicated on Drawings.
2. Alternate: Corridor seating is Contractor-Furnished/Contractor-Installed, as indicated on Drawings.

O. Alternate No. G15 – Lecterns:

1. Base Bid: Lecterns in Rooms 101, 118, 119, 201, 202, 203, 204, and 218 are Owner-Furnished/Contractor-Installed.
2. Alternate: Lecterns in Rooms 101, 118, 119, 201, 202, 203, 204, and 218 are Contractor-Furnished/Contractor-Installed.

P. Alternate No. G16 – Laboratory Sinks:

1. Base Bid: Provide laboratory sinks constructed of undermounted epoxy resin matching material and color of epoxy resin countertops.
2. Alternate: Provide laboratory sinks constructed of drop-in stainless steel, as indicated on Drawings and as specified.

Q. Alternate No. G17 – Air Handling Unit Warranty:

1. Base Bid: Do not provide an extended warranty for air handling units.
2. Alternate: Provide extended warranty for air handling units, inclusive of parts and labor, as specified.

R. Alternate No. G18 – West Patio:

1. Base Bid: Provide planting bed and concrete paving at west side of building, as indicated on Drawings.
2. Alternate: Provide west patio at west side of building, as indicated on Drawings.

S. Alternate No. G19 – Tree Grove:

1. Base Bid: Provide planting bed and concrete paving, as indicated on Drawings.
2. Alternate: Provide grove of trees, gravel paving, and benches and other site improvements indicated on Drawings.



T. Alternate No. G20 – Gravel Strips:

1. Base Bid: Do not provide plantings in gravel strips located adjacent to exterior building walls, as indicated on Drawings.
2. Alternate: Provide plantings in gravel strips located adjacent to exterior building walls, as indicated on Drawings.

U. Alternate No. G21 – Code-Required and Wayfinding Signage:

1. Base Bid: Code-required and wayfinding signage is Owner-Furnished/Owner-Installed as indicated on Drawings.
2. Alternate: Code-required and wayfinding signage is Contractor-Furnished/Contractor-Installed as indicated on Drawings.

V. Alternate No. G22 – Electric Vehicle Charging Stations:

1. Base Bid: Provide infrastructure for electric vehicle charging stations, as indicated on Drawings.
2. Alternate: Provide infrastructure and vehicle charging stations for electric vehicle charging stations, as indicated on Drawings and specified.

W. Alternate No. G23 – Electronic Leak Detection:

1. Base Bid: Do not provide electronic leak detection field quality control testing.
2. Alternate: Provide electronic leak detection field quality control testing, as specified in Section 075400 "Thermoplastic Roofing."

X. Alternate No. G24 – Parapet Insulation:

1. Base Bid: Do not provide insulation in brick parapet above top of roof, as indicated on Drawings.
2. Alternate: Provide insulation in brick parapet above top of roof, as indicated on Drawing.

**END OF SECTION**



## **SECTION 012500**

### **SUBSTITUTION PROCEDURES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Administrative and procedural requirements for substitutions during construction.
- B. Related Requirements:
  - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers, including definition and limitations on comparable products.

##### **1.2 DEFINITIONS**

- A. Substitutions: Contractor proposed changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions as follows:
    - a. Unavailability of specified product through no fault of Contractor.
    - b. Inability of specified product to perform as intended or to fit in designated space.
    - c. Regulatory changes.
    - d. Unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor that are not required to meet other Project requirements but may offer advantage to Owner.

##### **1.3 ACTION SUBMITTALS**

- A. Substitution Requests: Submit documentation, to Owner and Architect simultaneously, identifying product or fabrication or installation method to be replaced. Include Specification Section number and title, Specification Section paragraph designation and title, and Drawing numbers and titles.
  - 1. Substitution Request Form: Construction Specifications Institute (CSI) Form 13.1A, included hereinafter this Section.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable, and proposed advantage to Owner.

- b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and Owner's separate contractors that will be necessary to accommodate proposed substitution.
  - c. Detailed comparison of performance characteristics and significant qualities of proposed substitutions with those of the Work specified.
    - 1) Include annotated copy of applicable Specification Section.
    - 2) Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated.
    - 3) Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. Items specifically required as submittals in applicable Specification Section.
  - h. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
  - i. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
  - j. Research reports evidencing compliance with building code in effect for Project, from ICC-ES, Intertek, or other qualified testing agency acceptable to authorities having jurisdiction.
  - k. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time.
    - 1) If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer of specified product, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - l. Cost information, including a proposal of change, if any, in the Contract Sum.
  - m. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
  - n. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
  - o. Other data as requested by Architect.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation requested by Architect, whichever is later.
- a. Forms of Acceptance: One of the following:
    - 1) Architect's signature of approval on substitution request form.
      - a) Upon receipt of approved substitution request form, issue a Change Order in accordance with Section 012600 "Contract Modification Procedures" to modify the Contract to include the accepted substitution.
    - 2) Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work issued in accordance with Section 012600 "Contract Modification Procedures".

- b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

#### **1.4 QUALITY ASSURANCE**

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials.
- B. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

#### **1.5 PROCEDURES**

- A. Coordination: Revise or adjust affected Work as necessary to integrate Work of the approved substitutions.

#### **1.6 SUBSTITUTIONS**

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
  - 1. Conditions: Owner and Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Requested substitution provides sustainable design characteristics that specified product provided, including energy performance.
    - c. Substitution request is fully documented and properly submitted.
    - d. Requested substitution will not adversely affect Contractor's construction schedule.
    - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - f. Requested substitution is compatible with other portions of the Work.
    - g. Requested substitution has been coordinated with other portions of the Work.
    - h. Requested substitution provides specified warranty.
    - i. If requested substitution involves more than one subcontractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all subcontractors involved.
- B. Substitutions for Convenience: Not allowed.

Durham Technical Community College  
**Life Sciences Building – Early Equipment Package**  
Durham, North Carolina  
Andre Johnson Architect Project No. P2309.00  
SCO ID No.:23-26245-02B  
NCCCS No.: 2731

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**PART 2 - PRODUCTS**

**NOT USED**

**PART 3 - EXECUTION**

**NOT USED**

**END OF SECTION**



## SUBSTITUTION REQUEST

(After the Bidding/Negotiating Phase)

Project: \_\_\_\_\_ Substitution Request Number: \_\_\_\_\_  
\_\_\_\_\_  
From: \_\_\_\_\_  
To: \_\_\_\_\_ Date: \_\_\_\_\_  
\_\_\_\_\_  
A/E Project Number: \_\_\_\_\_  
Re: \_\_\_\_\_ Contract For: \_\_\_\_\_

Specification Title: \_\_\_\_\_ Description: \_\_\_\_\_  
Section: \_\_\_\_\_ Page: \_\_\_\_\_ Article/Paragraph: \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_  
Trade Name: \_\_\_\_\_ Model No.: \_\_\_\_\_  
Installer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_

History: ☐ New product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

☐ Point-by-point comparative data attached — REQUIRED BY A/E

Reason for not providing specified item: \_\_\_\_\_  
\_\_\_\_\_

### Similar Installation:

Project: \_\_\_\_\_ Architect: \_\_\_\_\_  
Address: \_\_\_\_\_ Owner: \_\_\_\_\_  
\_\_\_\_\_ Date Installed: \_\_\_\_\_

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain \_\_\_\_\_  
\_\_\_\_\_

Savings to Owner for accepting substitution: \_\_\_\_\_ (\$ \_\_\_\_\_).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] \_\_\_\_\_ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ \_\_\_\_\_

# SUBSTITUTION REQUEST

(After the Bidding/Negotiating Phase — Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: \_\_\_\_\_

Signed by: \_\_\_\_\_

Firm: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Attachments: ☐

## A/E's REVIEW AND RECOMMENDATION

- ☐ Approve Substitution - Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Approve Substitution as noted - Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Reject Substitution - Use specified materials.
- ☐ Substitution Request received too late - Use specified materials.

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

## OWNER'S REVIEW AND ACTION

- ☐ Substitution approved - Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures. Prepare Change Order.
- ☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures. Prepare Change Order.
- ☐ Substitution rejected - Use specified materials.

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E



## **SECTION 012900**

### **PAYMENT PROCEDURES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

##### **1.2 DEFINITIONS**

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

##### **1.3 SCHEDULE OF VALUES**

- A. Submit schedule of values within 30 days of Notice to Proceed, and prior to initial Application for Payment.
- B. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect and Owner at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Application for Payment.
  - 3. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
- C. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Owner's name.

- c. Owner's Project number.
  - d. Name of Architect.
  - e. Architect's Project number.
  - f. Contractor's name and address.
  - g. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
  - a. Related Specification Section or Division.
  - b. Description of the Work.
  - c. Name of subcontractor.
  - d. Name of manufacturer or fabricator.
  - e. Name of supplier.
  - f. Change Orders (numbers) that affect value.
  - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
    - 1) Labor.
    - 2) Materials.
    - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Provide a separate line item for bonds.
6. Provide a separate line item for insurance.
7. Provide a separate line item for Construction Manager's construction management fee.
8. Provide a separate line item for Construction Manager's contingency.
9. Provide a separate line item for project reserve, if any.
10. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - a. Differentiate between items stored on-site and items stored off-site.
11. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
12. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual Work in place as separate line items.
13. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
14. Schedule of Values Revisions: Revise the schedule of values when a Change Order, Field Order, or Field Change result in a change in the Contract Sum.
  - a. Use Project Manual table of contents as a guide to establish line items for each Change Order, Field Order, and Field Change. Provide at least one line item for each applicable Specification Section.

#### **1.4 APPLICATIONS FOR PAYMENT**

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the General Conditions of the Contract. The period of construction Work covered by each Application for Payment is the period indicated in the General Conditions of the Contract.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
  - 1. Other Application for Payment forms proposed by the Contractor may be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.
- D. Transmittal: Submit digitally signed copy of each Application for Payment to Architect via construction document management software system specified in Section 013100 "Project Management and Coordination".
- E. Application Preparation: Complete every entry on form. Execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  - 3. Include amounts of Change Orders and Field Orders issued before last day of construction period covered by application.
  - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed.
  - 1. Differentiate between items stored on-site and items stored off-site.
  - 2. Payment for stored materials shall not include raw materials or commodity products, including but not limited to, piping, conduit, concrete masonry units, cold-formed or light-gauge metal framing, and gypsum board.
  - 3. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
  - 4. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  - 5. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.

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- c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- 6. Off-Site Stored Materials: Payment for off-site stored materials is subject to advanced written approval by the Owner, Architect, and State Construction Office. When the Application for Payment includes off-site stored materials or equipment, the application shall include certification of the following:
  - a. Description of each item.
  - b. Location of independent, bonded and insured warehouse, including written approval of location by Construction Manager's bonding and insurance companies.
    - 1) Location shall be as close to the Project site as possible.
    - 2) Location shall not be the material's point of manufacture, except upon special approval which shall include an agreement by the storing party which unconditionally gives the Owner absolute right to possession of the materials at any time.
  - c. That each item is stored in the name of the Owner, and covered by all contractual requirements, including fire insurance with extended coverage for the full value of the item, and liability insurance.
  - d. That off-site stored materials have been inspected by Architect.
  - e. Bills of sale from the supplier (or other point of purchase) made out to the Owner, and other documentation evidencing purchase of such materials prior to the subsequent Application for Payment, the Owner's ownership thereof and the release of any right, title or lien thereto by any vendor (or that such payment and release of vendor rights shall be made out of the funds so requisitioned by the Contractor).
  - f. Certification that the item, or any part thereof, shall not be moved except for transportation to the Project site; shall not be installed in any construction other than the Work under this Contract; and shall be installed within 45 days from the date of receipt of the item by the Contractor at the off-site storage location.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
  - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  - 2. When an application shows completion of an item, submit conditional final or full waivers.
  - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  - 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  - 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
  - 1. List of subcontractors.
  - 2. Schedule of values.
  - 3. Contractor's construction schedule (startup construction schedule, if not final).
  - 4. Submittal schedule (initial submittal schedule, if not final).
  - 5. List of Contractor's staff assignments.

6. List of Contractor's principal consultants.
  7. Contractor's quality control plan.
  8. Site utilization plan.
  9. Implementation and termination schedule for each temporary utility.
  10. Moisture- and mold-protection plan.
  11. Copies of building permits.
  12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  13. Initial progress report.
  14. Report or minutes of preconstruction conference(s).
  15. Certificates of insurance and insurance policies.
  16. Performance and payment bonds.
  17. Data needed to acquire Owner's insurance.
- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
    - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."
  2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements, including submittal of operation and maintenance manuals, warranties, bonds, guarantees, maintenance agreements, record drawings, records of transfer of maintenance materials (attic stock) and keys, and records of Owner demonstration and training.
  2. Inspection certificates from agencies having jurisdiction.
  3. Certification of completion of final list of deficient and incomplete items.
  4. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  5. Updated final statement, accounting for final changes to the Contract Sum.
  6. AIA Document G706 "Contractor's Affidavit of Payment of Debts and Claims."
    - a. Comply with requirements in the General Conditions of the Contract for the Contractor's affidavit of payment to material suppliers and subcontractors, including submittal of similar affidavits from the principal trade and specialty contractors.
  7. List of minority business subcontractors and material suppliers showing breakdown of contract amounts and total actual payments to business subcontractors and material suppliers.
  8. AIA Document G706A "Contractor's Affidavit of Release of Liens."
  9. Affidavit of payment to material suppliers and subcontractors.
  10. AIA Document G707 "Consent of Surety to Final Payment."
  11. Certificates of state agencies required by state law.

12. Evidence that claims have been settled.
13. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
14. Final liquidated damages settlement statement.
15. Proof that taxes, fees, and similar obligations are paid.
16. Waivers and releases.

## **PART 2 - PRODUCTS**

**NOT USED**

## **PART 3 - EXECUTION**

**NOT USED**

**END OF SECTION**

## **SECTION 013100**

### **PROJECT MANAGEMENT AND COORDINATION**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

A. Section Includes:

1. Administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
  - a. General coordination procedures.
  - b. Coordination drawings.
  - c. Requests for information (RFI).
  - d. Digital project management procedures.
  - e. Project meetings.

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017123 "Field Engineering" for field-engineering services, including establishment of benchmarks and control points.
3. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

##### **1.2 ACTION SUBMITTALS**

A. Key Personnel Names: Within 10 days of starting construction operations, submit for approval by Architect and Owner, a list of key personnel assignments, including superintendent, safety officer, and other personnel in attendance at Project site.

1. Identify individuals and their duties and responsibilities, list addresses, cellular telephone numbers, and e-mail addresses.
  - a. Identify hierarchy of on-site personnel in responsible charge of the construction site with appropriate lines of authority to act on behalf of the Contractor.
2. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
3. Post copies of list in Project meeting room, in temporary field office, construction document management software system, and in prominent location in built facility. Keep list current at all times.

### **1.3 INFORMATIONAL SUBMITTALS**

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.
  - 1. Include the following information in tabular form:
    - a. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
    - b. Number and title of related Specification Section(s) covered by subcontract.
    - c. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Coordination Drawings: Submit five full size sets of paper prints. Architect will retain three copies, and return two.

### **1.4 GENERAL COORDINATION PROCEDURES**

- A. Coordination: Coordinate construction operations to ensure efficient and orderly installation of each part of the Work.
  - 1. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
  - 2. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 3. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 4. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination.
  - 1. Include such items as required notices, reports, and list of attendees at meetings.
  - 2. Prepare similar memoranda for Owner and Owner's separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities, including work by Owner and work by Owner's separate contractors, to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.



## 1.5 COORDINATION DRAWINGS

- A. Coordination Drawings: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts, but not less than the scale indicated on the Drawings for the affected area. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable Drawings as a basis for preparation of coordination drawings.
    - b. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - c. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    - d. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - e. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    - f. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    - g. Indicate required installation sequences.
    - h. Indicate dimensions shown on Drawings.
      - 1) Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
      - 2) Provide alternative sketches to Architect indicating proposed resolution of such conflicts.
      - 3) Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show the following:
    - a. Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work.
      - 1) Structural Penetrations: Indicate penetrations and openings required for all disciplines.
      - 2) Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
      - 3) Mechanical and Plumbing Work: Show the following:
        - a) Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
        - b) Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
        - c) Fire-rated enclosures around ductwork.
      - 4) Electrical Work: Show the following:
        - a) Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.

- b) Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    - c) Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
    - d) Location of pull boxes and junction boxes, dimensioned from column center lines.
  - 5) Fire-Protection System: Show the following:
    - a) Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
    - b)
    - c) Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
    - d) Supplement plan drawings with section drawings where required to adequately represent the Work.
- 2. Laboratory Spaces: Show the following:
  - a. Laboratory casework and equipment.
  - b. Mechanical, plumbing, and electrical services to laboratory casework and equipment.
- 3. Plenum Space: Show the following:
  - a. Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work.
  - b. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings.
  - c. Indicate areas of conflict between light fixtures and other components.
- 4. Exterior Wall Assemblies: Show the following:
  - a. Plan and section details for exterior wall assemblies showing relationship and attachment of each system or component, including exterior cladding, water resistive barrier, air barrier, air barrier transitions, flashings, insulation, fenestration, roller shades, and accessories such as door thresholds.
- C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
  - 1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
  - 2. Commence routing of coordination drawing files with HVAC installer, who will provide drawing plan files denoting approved ductwork. HVAC installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing installer.
  - 3. Plumbing installer will locate plumbing and equipment on a single layer, using blue color.
  - 4. Fire Sprinkler installer will locate piping and equipment, using red color. Fire Sprinkler installer shall forward drawing files to Electrical Installer.
  - 5. Electrical installer will indicate service and feeder conduit runs and equipment in green color. Electrical installer shall forward drawing files to Communications and Electronic Safety and Security installer.
  - 6. Communications and Electronic Safety and Security installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security installer shall forward completed drawing files to Contractor.
  - 7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.

- D. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
  - 1. Maintain one set of marked-up paper copies of the coordination drawings, incorporating new and revised conditions.
- E. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.

## **1.6 REQUESTS FOR INFORMATION (RFI)**

- A. Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  - 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  - 2. Coordinate and submit RFIs in a prompt manner to avoid delays in the Work.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
  - 1. Project name.
  - 2. Owner name.
  - 3. Owner's Project number.
  - 4. Name of Architect.
  - 5. Architect's Project number.
  - 6. Date.
  - 7. Name of Contractor.
  - 8. RFI number, numbered sequentially.
  - 9. RFI subject.
  - 10. Specification Section number and title and related paragraphs, as appropriate.
  - 11. Drawing number and detail references, as appropriate.
  - 12. Field dimensions and conditions, as appropriate.
  - 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  - 14. Contractor's signature.
  - 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716 or software-generated form with substantially the same content as indicated above, acceptable to Architect.
  - 1. Attachments shall be electronic files in PDF format.

- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
  3. If Contractor believes the RFI response warrants a change in the Contract Time or the Contract Sum, notify Architect in writing within 7 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly and include current RFI log with each progress meeting minutes. Include the following:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number, including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's response was received.
  8. Identification of related Change Order, Field Order, or Field Change.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

## **1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES**

- A. Use of Architect's Digital Data Files: Digital data files of Architect's Building Information Model (BIM) will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
  2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
  3. Digital data files are not Contract Documents.
  4. Digital Drawing Software Program: Drawings are available in Revit.
  5. Contractor shall execute the AJA Electronic Files for User's Convenience data licensing agreement attached at the end of this Section prior to furnishing digital data files of Drawings.

6. The following digital data files will be furnished for each appropriate discipline:
  - a. Floor plans.
  - b. Reflected ceiling plans.
  - c. Exterior elevations.
  - d. Exterior wall sections.
- B. Construction Document Management Software System: Provide, administer, and use construction document management software system for purposes of hosting and managing Project communication and documentation in electronic form until final completion.
  1. Construction document management software system shall include, at a minimum, the following features:
    - a. Compilation of Project Contract Documents, Project communications required in individual Specification Sections, including, but not limited to, substitution requests, RFIs, submittals, construction schedule, construction progress photographs, Change Orders, Field Orders, Field Changes, Applications and Certifications for Payment, meeting minutes, Drawings, Specifications, coordination drawings, construction progress photographs, and list of incomplete and deficient Work.
    - b. Compilation of Project data for each entity involved in Project, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and Owner's consultants. Include names of individuals and contact information.
    - c. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
    - d. Document workflow planning, allowing customization of workflow between project entities.
    - e. Creation, logging, tracking, and notification for Project communications required in individual Specification Sections, including, but not limited to, substitution request, RFIs, submittals, Change Orders, Field Orders, and Field Changes.
    - f. Track status of each Project communication in real time, and log time and date when responses are provided.
    - g. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
    - h. Processing and tracking of payment applications.
    - i. Processing and tracking of contract modifications.
    - j. Creating and distributing meeting minutes.
    - k. Document management for Drawings, Specifications, and coordination drawings, including revision control.
    - l. Management of construction progress photographs.
    - m. Creating, distributing, tracking, and updating list of incomplete items (punch list) in accordance with Section 017700 "Closeout Procedures."
    - n. Mobile device compatibility, including smartphones and tablets.
    - o. Software system tutorials, training videos, and user support.
  2. Provide free user licenses for use by Owner, Owner's Commissioning Authority, Architect, and their consultants.
  3. At completion of Project, provide digital archive of documents generated or stored within construction document management software system in format acceptable to Owner and Architect.
  4. Products: Provide one of the following:
    - a. Autodesk Inc.; Construction Cloud.
    - b. Corecon Technologies, Inc.; Corecon.
    - c. Trimble Inc.; Prolog or ProjectSight.
    - d. Newforma, Inc.; ConstructEx.

- e. Oracle; Primavera Submittal Exchange.
  - f. Procore Technologies, Inc.; Procore.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
  - 1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  - 2. Name file with submittal number or other unique identifier, including revision identifier.
  - 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

## **1.8 PROJECT MEETINGS**

- A. Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
  - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
  - 2. Agenda: Prepare the meeting agenda and distribute to all invited attendees.
  - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Contractor, Owner, and Architect, but no later than 10 days after Notice to Proceed.
  - 1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent and its safety officer; major subcontractors and suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Responsibilities and personnel assignments.
    - b. Tentative construction schedule.
    - c. Phasing.
    - d. Critical work sequencing and long lead items.
    - e. Designation of key personnel and their duties.
    - f. Lines of communications.
    - g. Use of construction document management software system.
    - h. Procedures for processing field decisions and Change Orders.
    - i. Procedures for RFIs.
    - j. Procedures for testing and inspecting.
    - k. Procedures for processing Applications for Payment.
    - l. Distribution of the Contract Documents.
    - m. Submittal procedures.
    - n. Preparation of Record Documents.
    - o. Use of the premises.
    - p. Work restrictions.

- q. Working hours.
  - r. Owner's occupancy requirements.
  - s. Responsibility for temporary facilities and controls.
  - t. Procedures for moisture and mold control.
  - u. Procedures for disruptions and shutdowns.
  - v. Construction waste management and recycling.
  - w. Parking availability.
  - x. Office, work, and storage areas.
  - y. Equipment deliveries and priorities.
  - z. First aid.
  - aa. Security.
  - bb. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Building Enclosure Preconstruction Conference: Schedule and conduct a building enclosure preconstruction conference before starting exterior building enclosure construction, at a time convenient to Owner and Architect, but no later than 60 days after the Notice to Proceed, and prior to beginning shop drawings for exterior building enclosure systems.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; representatives of testing and inspection agencies; Contractor and its superintendent; subcontractors, suppliers, and representatives of manufacturers and fabricators related to systems listed below; and other concerned parties involved in the construction of exterior building enclosure systems. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
- a. Unit masonry.
  - b. Cold-formed metal framing.
  - c. Decorative metal.
  - d. Wall and parapet sheathing.
  - e. Waterproofing systems.
  - f. Thermal insulation.
  - g. Vapor retarders.
  - h. Air barriers.
  - i. Metal wall panels.
  - j. Roofing systems.
  - k. Flashings.
  - l. Exterior joint sealants.
  - m. Exterior doors.
  - n. Aluminum-framed entrances and storefronts.
  - o. Glazed curtain walls.
  - p. Exterior louvers.
  - q. Facility fall protection.
  - r. Subdrainage systems.
2. Agenda: Discuss schedule of construction activities and preparations and performance for the exterior building enclosure systems, including requirements for the following:
- a. Responsibilities and personnel assignments.
  - b. Critical work sequencing and long-lead items.
  - c. Designation of key personnel and their duties.
  - d. Testing and inspecting requirements and procedures.
  - e. Temporary facilities and controls.

- f. Space and access limitations.
    - g. Regulations of authorities having jurisdiction.
    - h. Related Change Orders, Field Orders, and Field Changes.
    - i. Related RFIs.
    - j. Contract requirements related to building enclosure systems integration.
    - k. Possible conflicts.
    - l. Weather limitations and limiting exposures.
    - m. Procedures for preinstallation conferences for individual building enclosure systems.
    - n. Coordination with other Work.
    - o. Coordination drawings for exterior wall assemblies.
    - p. Minimum energy performance requirements.
    - q. Quality assurance procedures, including mockups.
    - r. Weather limitations and limiting exposures.
    - s. Compatibility of materials.
    - t. Protection of construction.
    - u. Protection of adjacent Work.
    - v. Required performance results.
    - w. Manufacturer's written recommendations.
    - x. Acceptability of substrates.
    - y. Installation procedures.
    - z. Warranty requirements.
  - 3. Minutes: Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
    - a. Distribute minutes to each party present and to other parties requiring information.
  - 4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner's Commissioning Authority of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related Change Orders, Field Orders, and Field Changes.
    - d. Purchases.
    - e. Deliveries.
    - f. Submittals.
    - g. Review of mockups.
    - h. Possible conflicts.
    - i. Compatibility requirements.
    - j. Time schedules.
    - k. Weather limitations.
    - l. Manufacturer's written instructions.



- m. Warranty requirements.
    - n. Compatibility of materials.
    - o. Acceptability of substrates.
    - p. Temporary facilities and controls.
    - q. Space and access limitations.
    - r. Regulations of authorities having jurisdiction.
    - s. Testing and inspecting requirements.
    - t. Installation procedures.
    - u. Coordination with other work.
    - v. Required performance results.
    - w. Protection of adjacent work.
    - x. Protection of construction and personnel.
  - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  - 2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of Record Documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Procedures for completing and archiving construction document management software system.
    - d. Submittal of written warranties.
    - e. Requirements for preparing operations and maintenance data.
    - f. Requirements for delivery of material samples, maintenance materials (attic stock), and spare parts.
    - g. Requirements for demonstration and training.
    - h. Preparation of Contractor's list of deficient and incomplete Work.
    - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - j. Submittal procedures.
    - k. Coordination with Owner's separate contractors and Owner's construction personnel.
    - l. Owner's partial occupancy requirements.
    - m. Installation of Owner's furniture, fixtures, and equipment.
    - n. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

F. Progress Meetings: Conduct progress meetings at monthly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Contractor, Owner, Owner's Commissioning Authority and Architect, include representatives of each principal trade and each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
  - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - 1) Review schedule for next period.
  - b. Review present and future needs of each entity present, including the following:
    - 1) Interface requirements.
    - 2) Sequence of operations.
    - 3) Status of submittals.
    - 4) Deliveries.
    - 5) Off-site fabrication.
    - 6) Access.
    - 7) Site use.
    - 8) Temporary facilities and controls.
    - 9) Progress cleaning.
    - 10) Quality and work standards.
    - 11) Status of correction of deficient items.
    - 12) Field observations.
    - 13) Status of RFIs.
    - 14) Status of Proposal Requests.
    - 15) Pending changes.
    - 16) Status of Change Orders, Field Orders, and Field Changes.
    - 17) Pending claims and disputes.
    - 18) Documentation of information for payment requests.
4. Minutes: Record and distribute the meeting minutes to each party present and to parties requiring information.
  - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
  - b. Construction Reports: Include copy of daily construction reports for previous month, as well as applicable copies of site condition reports and unusual event reports.

Durham Technical Community College  
**Life Sciences Building – Early Equipment Package**  
Durham, North Carolina  
Andre Johnson Architect Project No. P2309.00  
SCO ID No.:23-26245-02B  
NCCCS No.: 2731

April 02, 2025

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**END OF SECTION**



## Electronic Files for User's Convenience

As a convenience to your organization, Andre Johnson Architects (AJA+) is furnishing electronic copies of the contract documents in the BIM/CAD version in which they were developed for the above-mentioned project.

These files are not construction documents. The documents formally issued to you by the Owner or representative are the basis of your contract. Information contained in these files does not in any way replace or supplement the documents which form the basis of your contract. Use of the drawings and specifications in electronic media form by the Users shall be at their own risk and shall be without liability to AJA+, our consultants, officers, directors, and employees. Our sole liability and responsibility will be with respect to the printed hard copies. These files are being provided for your sole use on the project noted above only and may not be re-used in whole or in part. The BIM/CAD files provided by AJA+, under the terms of this Agreement, are the proprietary information and property of AJA+, who shall maintain all copyright and intellectual property rights in the BIM/CAD files. All BIM/CAD files shall be treated as confidential and are not to be disclosed to or shared with others without AJA's written consent. The use of the BIM/CAD files for any purpose other than for supplemental information for convenience of the User for this project is prohibited.

Once these files leave AJA+, we have no control over any modifications made by yourself or others and AJA+ cannot be held responsible for any claims that may arise out of the use of these documents.

The BIM/CAD data was prepared as an AJA+ internal working document. As such, it may be incomplete, contain unintentional inaccuracies, and/or be partially obsolete. Therefore, AJA+ makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. The User is further warned that, while all digital BIM/CAD data appears to be accurate, this apparent accuracy is an artifact of the techniques used to generate it and is in no way intended to imply actual accuracy. The User of this data takes full responsibility for the accuracy and correctness of all measurements, areas, inventories, etc., extracted from this data either manually or with the use of a computer. The BIM/CAD files are not to be used for fabrication or construction of any kind.

The User is advised that any translation of BIM/CAD data from one computer system or environment to another can and often does result in the loss of important data. This loss can include but may not be limited to: portions of text and dimensions; the existence, location or scale of symbols or other elements of graphics – the internal structure of the data, including layers and data attributes; and the style or weight of lines. AJA+ makes no representations as to the usability of this BIM/CAD data on any system.

Users of this computer data are advised to review all current and subsequent versions of project documentation for inconsistencies and revisions. It is the responsibility of the User to identify and make all required revisions or corrections to this data. AJA+ will not routinely issue updates to BIM/CAD data.

In recognition of the above, you agree, to the fullest extent permitted by law, to indemnify and hold AJA+ and its officers, employees and subsidiaries harmless from any damage, liability, claim, damage, loss or cost, including reasonable attorney's fees and costs of defense, arising from any use or modification of the digital files, plans and/or specifications by your organization, or any person or entity which acquires or obtains these documents from or through your organization. AJA+ makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall Loring be liable for any loss of income, loss of profits, or any damages.

Company: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Date: 00/00/00 \_\_\_\_\_

Project: Project Name- \_\_\_\_\_

Revit Files: ☐

CAD Files: ☐



## **SECTION 013300**

### **SUBMITTAL PROCEDURES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and for requirements for construction document management software system.
3. Section 013200 "Construction Progress Documentation" for submitting Contractor's construction schedule.
4. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and final completion construction photographs.
5. Section 014000 "Quality Requirements" for submitting test and inspection reports, manufacturer's technical representative's field reports, factory-authorized service representative's reports, and schedule of tests and inspections.
6. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material (attic stock) submittals.
7. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
8. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
9. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

##### **1.2 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals".
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals".

- C. Partial Submittals: Submittals that do not include all action and informational submittals required by a Specification Section.

### **1.3 SUBMITTAL SCHEDULE**

- A. Submittal Schedule: Within 15 days of Notice to Proceed, submit a list of submittals as follows:
  - 1. Arrange schedule in the following two formats:
    - a. Chronological order by dates required by construction schedule.
    - b. Numerical order by Specification Section number.
  - 2. Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
      - 1) Do not revise the original schedule date for first submittal in subsequent submittal schedule updates.
    - b. Specification Section number and title.
    - c. Submittal Category: Action; informational.
    - d. Name of subcontractor.
    - e. Separate line item for each type of submittal within each Section (Product Data, Shop Drawings, Samples, certificates, delegated design, test reports, evaluation reports, qualification statements, field reports, closeout submittals.)
    - f. Scheduled date for Architect's final release or approval.
    - g. Scheduled dates for purchasing.
    - h. Scheduled date of fabrication.
    - i. Scheduled dates for installation.
    - j. Activity or event number.
  - 3. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates.
  - 4. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
  - 5. Include proposed partial submittals and identify on submittal schedule as "Partial Submittal."
  - 6. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
- B. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.

### **1.4 SUBMITTAL FORMATS**

- A. Submittal Information: Include the following information in each submittal:
  - 1. Project name.
  - 2. Date.
  - 3. Name of Architect.
  - 4. Name of Construction Manager.
  - 5. Name of Contractor.
  - 6. Name of firm or entity that prepared submittal.



7. Names of subcontractor, manufacturer, and supplier.
  8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and numeric suffix for resubmittals.
    - a. Example: For Section 079200, first submittal is 079200-001 and 079200-001-01 is the first resubmittal.
  9. Category and type of submittal.
  10. Submittal purpose and description.
  11. Number and title of Specification Section, with paragraph number and generic name for each item.
  12. Drawing number and detail references, as appropriate.
  13. Indication of full or partial submittal.
  14. Location(s) where product is to be installed, as appropriate.
  15. Other necessary identification.
  16. Remarks.
  17. Signature of transmitter.
- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. Paper Submittals:
1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
  2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
  3. Action Submittals: Submit five paper copies of each submittal unless otherwise indicated. Architect will return two copies.
    - a. Architect will retain three copies – one for Architect, one for Owner, and one for SCO.
  4. Informational Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will not return copies.
  5. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
  6. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling.
  7. Samples:
    - a. Number of Samples: Submit five sets of Samples. Architect will retain three Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
      - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit range samples consisting of five sets of minimum three units each that show approximate limits of variations.
    - b. Identification: Permanently attach label on unexposed side of Samples that includes the following:

- 1) Project name and submittal number.
- 2) Generic description of Sample.
- 3) Product name and name of manufacturer.
- 4) Sample source.
- 5) Number and title of applicable Specification Section.
- 6) Specification paragraph number and generic name of each item.

## **1.5 SUBMITTAL PROCEDURES**

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  1. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
    - a. Partial submittals submitted without Architect's prior approval will be returned without review.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Examples of these items include the following:
      - 1) Doors, frames, and door hardware.
      - 2) Items requiring color selection by Architect.
- C. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals far enough in advance of the Work to permit processing, including resubmittals.
  1. Initial Review: Allow 20 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Resubmittal Review: Allow 20 days for review of each resubmittal.
- E. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
  3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- F. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- G. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## **1.6 SUBMITTAL REQUIREMENTS**

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data is unsuitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Manufacturer's installation instructions, including the following:
      - 1) Required field conditions, including substrate preparation and weather limitations.
      - 2) Sequence of installation or erection.
      - 3) Required installation tolerances.
      - 4) Recommendations for cleaning and protection.
    - d. Standard color charts.
    - e. Statement of compliance with specified referenced standards.
    - f. Testing by recognized testing agency.
    - g. Application of testing agency labels and seals.
    - h. Notation of coordination requirements.
    - i. Clearances required to other construction.
    - j. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams that show factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data concurrently with Shop Drawings and Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Quantities.
    - c. Schedules.
    - d. Compliance with specified standards.
    - e. Dimensions.
    - f. Fabrication drawings.
    - g. Setting diagrams.
    - h. Rough-in requirements.
    - i. Wiring diagrams indicating power, signal, and control wiring and conduits for both factory- and field- installed components.
    - j. Notation of coordination requirements.
    - k. Notation of dimensions established by field measurement.
    - l. Relationship and attachment to adjoining construction.
    - m. Seal and signature of professional engineer for delegated design portions of the Work.
  2. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on digital sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
- C. Samples: Submit physical Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
  2. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  3. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
  4. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected.
    - a. Samples include, but are not limited to, the following:
      - 1) Partial sections of manufactured or fabricated components.
      - 2) Small cuts or containers of materials.
      - 3) Complete units of repetitively used materials.
      - 4) Swatches showing color, texture, and pattern.
      - 5) Color range sets.
      - 6) Components used for independent testing and inspection.
  5. Fabrication Samples: Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, clearances, and other similar

characteristics are to be demonstrated. Comply with applicable requirements for Samples for Verification.

- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, model number, size, and color if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections.
1. Include list of assumptions and summary of loads.
  2. Include load diagrams if applicable.
  3. Provide name and version of software, if any, used for calculations.
  4. Number each page of submittal.
- G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
  2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
  3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
  4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
  5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
  6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
- H. Test and Research Reports:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.

2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Code-Compliance Research and Evaluation Reports: Submit written evidence, from a product testing laboratory or model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - a. Name of evaluation organization.
    - 1) Subject to authorities having jurisdiction, acceptable product testing laboratories and model code organizations include, but are not limited to, the following:
      - a) IAPMO Uniform Evaluation Services.
      - b) ICC Evaluation Service, LLC.
  - b. Date of evaluation.
  - c. Time period when report is in effect.
  - d. Product and manufacturers' names.
  - e. Description of product.
  - f. Test procedures and results.
  - g. Limitations of use.
7. Engineering Judgement Reports: Submit certification, signed and sealed by a qualified professional fire protection engineer acceptable to authorities having jurisdiction, stating that based on interpolation and evaluation of previously tested products and assemblies, the proposed product or assembly would comply with specified requirements when subjected to the required fire test standard for the application. Include the following information:
  - a. Date of engineering judgement report.
  - b. Manufacturer and product name.
  - c. Names and test results of previously tested products.
  - d. Conditions, assumptions, and limitations of engineering judgement.

## **1.7 DELEGATED-DESIGN SERVICES**

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## **1.8 CONTRACTOR'S REVIEW**

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp representing that Contractor has reviewed and approved the submittal; has determined and verified materials, field measurements, and field construction criteria related thereto, or will do so; and has checked and coordinated the information contained within the submittal with the requirements of the Work and of the Contract Documents. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
  - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.
- C. Inform Architect in writing, at time of submittal, of deviation from the Contract Documents.
- D. Direct specific attention, in writing or on resubmittal, to revisions other than those requested by Architect on previous submittals.

## **1.9 ARCHITECT'S REVIEW**

- A. Architect's Review: Architect's review of submittals is for the limited purpose of checking for design conformance and general conformance with information expressed in the Contract Documents. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions, tolerances, 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.
  - 1. The Architect's review shall not constitute approval of any construction means, methods, fabrication processes, techniques, sequences, or procedures, or of safety precautions and programs in connection with the Work, all of which remain the responsibility of the Contractor as required by the Contract Documents.
  - 2. The Architect's review shall not constitute approval of coordination of the Work, which remains the responsibility of the Contractor as required by the Contract Documents.
- B. Submittals will be reviewed in the sequence received by Architect.
- C. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.

1. Action submittals will be reviewed by the Architect with the following actions:
  - a. An action marked "APPROVED" indicates that the submittal appears to conform to the design intent of the Work, and that Contractor, at Contractor's discretion, may proceed with the fabrication, procurement, and installation.
  - b. An action marked "APPROVED AS NOTED" indicates that submittal, after noted comments are incorporated, would appear to conform to the design intent of the Work, and that Contractor, at Contractor's discretion, may proceed with the fabrication, procurement, and installation if the comments are accepted by Contractor without a claim for an increase in Contract Sum or an extension in Contract Time.
  - c. An action marked "REVISE AND RESUBMIT" indicates that the submittal does not appear to conform to the design intent of the Work, and that a resubmission is required, and that fabrication, procurement, and installation is not authorized.
- D. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- E. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
  1. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.
- F. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- G. Architect will return without review or discard submittals received from sources other than Contractor.
- H. Submittals not required by the Contract Documents will be returned by Architect without action.

## **PART 2 - PRODUCTS**

**NOT USED**

## **PART 3 - EXECUTION**

**NOT USED**

**END OF SECTION**



**SECTION 014000**  
**QUALITY REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Administrative and procedural requirements for quality assurance.
  - 2. Administrative and procedural requirements for quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections.
    - a. Requirements in individual Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Owner's Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
  - 1. Section 014339 "Mockups" for integrated exterior mockups.

**1.2 ALTERNATES**

- A. See Section 012300 "Alternates" for description of alternates affecting items specified in this Section.

**1.3 DEFINITIONS**

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects and similar in nature, size, and extent to this Project, using the same materials, systems, products, and installation methods as those required for this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
  - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged. Where indicated in individual Specification Sections, construction and approval of mockups shall precede ordering and release of materials and finishes for the remaining portion of the Work.
  - 1. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
  - 2. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
  - 1. Unless otherwise indicated in individual Specification Sections, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a national testing agency (NTA) accredited to ISO 017025, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish and certify product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both.
  - 1. The term "testing laboratory" shall have the same meaning as the term "testing agency."
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements.
  - 1. Contractor's quality-control services do not include contract administration activities performed by Architect.

#### **1.4 DELEGATED-DESIGN SERVICES**

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated.
  - 1. Include list of codes, loads, and other factors used in performing these services.

#### **1.5 CONFLICTING REQUIREMENTS**

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
  - 1. In the case of conflicting standards and other requirements, and conflicts or discrepancies between Drawings and the Specifications not clarified by addenda, the better quality or greater quantity of Work shall be deemed to be the basis of the Contractor's bid and the Contract Sum and shall be provide by the Contractor in accordance with the Architect's interpretation.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed.
  - 1. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.
  - 2. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements.
  - 3. Refer uncertainties to Architect for a decision before proceeding.

## **1.6 INFORMATIONAL SUBMITTALS**

- A. Contractor's Quality-Control Plan: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience.
  - 1. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.
- E. Reports: Prepare and submit certified written reports and documents as specified.
- F. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

## **1.7 CONTRACTOR'S QUALITY-CONTROL PLAN**

- A. Quality-Control Plan:
  - 1. Prepare in format acceptable to Architect.
  - 2. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities.
  - 3. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
  - 1. Project quality-control manager shall not have other Project responsibilities.
- C. Quality Control Procedures: In quality control plan, describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections.
    - a. Include required tests and inspections and Contractor-elected tests and inspections.
    - b. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
  - 3. Owner-performed tests and inspections indicated in the Contract Documents.
  - 4. Commissioning test and inspections indicated to be performed or witnessed by Owner's Commissioning Authority.
- E. Supervision of Work: Describe process for constant and efficient supervision of the Work.
- F. Continuous Inspection of Workmanship: Describe process for continuous inspection of workmanship during construction to identify and correct deficiencies in the Work in addition to testing and inspection specified.
  - 1. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- G. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results.
  - 1. Include Work Architect has indicated as nonconforming or defective.
  - 2. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements.
  - 3. Comply with requirements of authorities having jurisdiction.

## **1.8 REPORTS AND DOCUMENTS**

- A. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents.
  - 1. Coordinate and submit concurrently with Contractor's Construction Schedule.
  - 2. Update and submit with each Application for Payment.
  - 3. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
  - 4. Distribution: Distribute schedule to Owner, Architect, Owner's Commissioning Authority, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
- B. Test and Inspection Reports: Prepare and submit certified written reports specified in individual Specification Sections. Include the following:
  - 1. Date of issue.

2. Project title and number.
  3. Name, address, telephone number, and email address of testing agency.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.
  6. Description of the Work and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and reinspecting.
- C. Test and Inspection Log: Prepare and maintain a recorded log of tests and inspections at Project site.
1. Post changes and revisions as they occur.
  2. Provide access to test and inspection log for Architect's, Owner's Commissioning Authority's, and authorities' having jurisdiction reference during normal working hours.
  3. Include the following:
    - a. Date test or inspection was conducted.
    - b. Description of the Work tested or inspected.
    - c. Date test or inspection results were transmitted to Architect.
    - d. Identification of testing agency or special inspector conducting test or inspection.
  4. Submit log at Project closeout as part of Project Record Documents.
- D. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in individual Specification Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement of whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- E. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in individual Specification Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.

3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

## **1.9 QUALITY ASSURANCE**

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
  1. Procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated.
  1. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged in the activities indicated.
  1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, start-up, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:
  - 1. Provide test specimens representative of proposed products and construction.
  - 2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
  - 3. Provide sizes and configurations of test assemblies and mockups to adequately demonstrate capability of products to comply with performance requirements.
  - 4. Build test assemblies and mockups, using installers who will perform same tasks for Project.
  - 5. Unless otherwise indicated in individual Specification Sections, when testing is complete, remove test specimens and test assemblies and mockups; do not reuse products on Project.
  - 6. **Testing Agency Responsibilities:** Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Owner's Commissioning Authority, with copy to Contractor.
    - a. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. **Mockups:** Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockups of size indicated.
  - 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
  - 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  - 4. Employ supervisory personnel who will oversee mockup construction. Build mockups using installers who will perform same tasks during construction for Project.
  - 5. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  - 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
  - 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
  - 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 10. Demolish and remove mockups when directed unless otherwise indicated.



## **1.10 QUALITY CONTROL**

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
  - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility.
  - 1. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
  - 2. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  - 3. Engage a qualified testing agency to perform quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  - 4. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
  - 5. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  - 6. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  - 7. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect, Owner's Commissioning Authority and Contractor in performance of duties.
  - 1. Provide qualified personnel to perform required tests and inspections.
  - 2. Notify Architect, Owner's Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 3. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
  - 4. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
  - 5. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  - 6. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  - 7. Do not perform duties of Contractor.

- E. Manufacturer's Technical Representative's Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work.
  - 1. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of installer activities, inspection of completed portions of the Work, and submittal of written reports.
- F. Factory-Authorized Service Representative's Services: Where indicated in individual Specification Sections, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections.
  - 1. Report results in writing as specified in Section 013300 "Submittal Procedures."
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services; and provide reasonable auxiliary services as requested.
  - 1. Notify agency sufficiently in advance of operations to permit assignment of personnel.
  - 2. Provide the following:
    - a. Access to the Work.
    - b. Incidental labor and facilities necessary to facilitate tests and inspections.
    - c. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
    - d. Facilities for storage and field curing of test samples.
    - e. Preliminary design mix proposed for use for material mixes that require control by testing agency.
    - f. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

#### **1.11 SPECIAL TESTS AND INSPECTIONS**

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
  - 1. Notifying Architect, Owner's Commissioning Authority, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 2. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Owner's Commissioning Authority with copy to Contractor and to authorities having jurisdiction.
  - 3. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  - 4. Interpreting special tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

5. Retesting and reinspecting corrected Work.
6. Work requiring special tests and inspections includes the following:
  - a. Concrete formwork.
  - b. Concrete reinforcing.
  - c. Concrete.
  - d. Anchors installed in concrete.
  - e. Structural steel.
  - f. Open-web steel joist and joist girders.
  - g. Steel decks.
  - h. Masonry.
  - i. Cold-formed steel trusses spanning 60 feet or more.
  - j. Prefabricated wood structural elements and assemblies.
  - k. Sprayed fire-resistant materials.
  - l. Mastic and intumescent fire-resistant coatings.
  - m. Fire-resistant penetrations.
  - n. Fire-resistant joint systems.
  - o. Soil conditions.
  - p. Soil fill placement.
  - q. Deep foundations.
  - r. Wind resistance.
  - s. Seismic resistance.

## **PART 2 - PRODUCTS**

### **NOT USED**

## **PART 3 - EXECUTION**

### **3.1 REPAIR AND PROTECTION**

- A. On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in individual Specification Sections or matching existing substrates and finishes.
  2. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
  3. Comply with the Contract Document requirements for cutting and patching in Section 017329 "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

### **END OF SECTION**



## **SECTION 014200**

### **REFERENCES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Industry standards.
  - 2. Abbreviations and acronyms for industry organizations, code agencies, federal government agencies, state government agencies, and standards and regulation.

##### **1.2 INDUSTRY STANDARDS**

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced.
  - 1. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
  - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

##### **1.3 ABBREVIATIONS AND ACRONYMS**

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.
  - 1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
  - 2. AAMA - American Architectural Manufacturers Association; (See FGIA).

3. AAPFCO - Association of American Plant Food Control Officials; [www.aapfco.org](http://www.aapfco.org).
4. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
5. AATCC - American Association of Textile Chemists and Colorists; [www.aatcc.org](http://www.aatcc.org).
6. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).
7. ABMA - American Boiler Manufacturers Association; [www.abma.com](http://www.abma.com).
8. ACI - American Concrete Institute; (Formerly: ACI International); [www.concrete.org](http://www.concrete.org).
9. ACP - American Clean Power; (Formerly: American Wind Energy Association); [www.cleanpower.org](http://www.cleanpower.org).
10. ACPA - American Concrete Pipe Association; [www.concrete-pipe.org](http://www.concrete-pipe.org).
11. AEIC - Association of Edison Illuminating Companies, Inc. (The); [www.aeic.org](http://www.aeic.org).
12. AF&PA - American Forest & Paper Association; [www.afandpa.org](http://www.afandpa.org).
13. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
14. AHAM - Association of Home Appliance Manufacturers; [www.aham.org](http://www.aham.org).
15. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
16. AI - Asphalt Institute; [www.asphaltinstitute.org](http://www.asphaltinstitute.org).
17. AIA - American Institute of Architects (The); [www.aia.org](http://www.aia.org).
18. AISC - American Institute of Steel Construction; [www.aisc.org](http://www.aisc.org).
19. AISI - American Iron and Steel Institute; [www.steel.org](http://www.steel.org).
20. AITC - American Institute of Timber Construction; [www.plib.org](http://www.plib.org).
21. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
22. AMPP - Association for Materials Protection and Performance; [www.ampp.org](http://www.ampp.org).
23. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
24. AOSA/SCST - Association of Official Seed Analysts (The)/Society of Commercial Seed Technologists (The); [www.analyzeseeds.com](http://www.analyzeseeds.com).
25. APA - APA - The Engineered Wood Association; [www.apawood.org](http://www.apawood.org).
26. APA - Architectural Precast Association; [www.archprecast.org](http://www.archprecast.org).
27. API - American Petroleum Institute; [www.api.org](http://www.api.org).
28. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
29. ARI - American Refrigeration Institute; (See AHRI).
30. ARMA - Asphalt Roofing Manufacturers Association; [www.asphaltroofing.org](http://www.asphaltroofing.org).
31. ASA - American Shotcrete Association; [www.shotcrete.org](http://www.shotcrete.org).
32. ASCE - American Society of Civil Engineers; [www.asce.org](http://www.asce.org).
33. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
34. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; [www.ashrae.org](http://www.ashrae.org).
35. ASME - ASME International; (American Society of Mechanical Engineers); [www.asme.org](http://www.asme.org).
36. ASSE - American Society of Sanitary Engineering; [www.asse-plumbing.org](http://www.asse-plumbing.org).
37. ASSP - American Society of Safety Professionals (The); [www.assp.org](http://www.assp.org).
38. ASTM - ASTM International; [www.astm.org](http://www.astm.org).
39. ATIS - Alliance for Telecommunications Industry Solutions; [www.atis.org](http://www.atis.org).
40. AVIXA - Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); [www.avixa.org](http://www.avixa.org).
41. AWI - Architectural Woodwork Institute; [www.awinet.org](http://www.awinet.org).
42. AWMAC - Architectural Woodwork Manufacturers Association of Canada; [www.awmac.com](http://www.awmac.com).
43. AWPA - American Wood Protection Association; [www.awpa.com](http://www.awpa.com).
44. AWS - American Welding Society; [www.aws.org](http://www.aws.org).
45. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
46. BHMA - Builders Hardware Manufacturers Association; [www.buildershardware.com](http://www.buildershardware.com).
47. BIA - Brick Industry Association (The); [www.gobrick.com](http://www.gobrick.com).

48. BICSI - BICSI, Inc.; [www.bicsi.org](http://www.bicsi.org).
49. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); [www.bifma.org](http://www.bifma.org).
50. BISSC - Baking Industry Sanitation Standards Committee; [www.bissc.org](http://www.bissc.org).
51. BWF - Badminton World Federation; (Formerly: International Badminton Federation); [www.bissc.org](http://www.bissc.org).
52. CARB - California Air Resources Board; [www.arb.ca.gov](http://www.arb.ca.gov).
53. CDA - Copper Development Association; [www.copper.org](http://www.copper.org).
54. CE - Conformite Europeenne; [www.ec.europa.eu/growth/single-market/ce-marking](http://www.ec.europa.eu/growth/single-market/ce-marking).
55. CEA - Canadian Electricity Association; [www.electricity.ca](http://www.electricity.ca).
56. CFFA - Chemical Fabrics and Film Association, Inc.; [www.chemicalfabricsandfilm.com](http://www.chemicalfabricsandfilm.com).
57. CFSEI - Cold-Formed Steel Engineers Institute; [www.cfsei.org](http://www.cfsei.org).
58. CGA - Compressed Gas Association; [www.cganet.com](http://www.cganet.com).
59. CIMA - Cellulose Insulation Manufacturers Association; [www.cellulose.org](http://www.cellulose.org).
60. CISCA - Ceilings & Interior Systems Construction Association; [www.cisca.org](http://www.cisca.org).
61. CISPI - Cast Iron Soil Pipe Institute; [www.cispi.org](http://www.cispi.org).
62. CLFMI - Chain Link Fence Manufacturers Institute; [www.chainlinkinfo.org](http://www.chainlinkinfo.org).
63. CPA - Composite Panel Association; [www.compositepanel.org](http://www.compositepanel.org).
64. CRI - Carpet and Rug Institute (The); [www.carpet-rug.org](http://www.carpet-rug.org).
65. CRRC - Cool Roof Rating Council; [www.coolroofs.org](http://www.coolroofs.org).
66. CRSI - Concrete Reinforcing Steel Institute; [www.crsi.org](http://www.crsi.org).
67. CSA - CSA Group; [www.csa-group.org](http://www.csa-group.org).
68. CSI - Cast Stone Institute; [www.caststone.org](http://www.caststone.org).
69. CSI - Construction Specifications Institute (The); [www.csiresources.org](http://www.csiresources.org).
70. CSSB - Cedar Shake & Shingle Bureau; [www.cedarbureau.org](http://www.cedarbureau.org).
71. CTA - Consumer Technology Association; [www.cta.tech](http://www.cta.tech).
72. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); [www.coolingtechnology.org](http://www.coolingtechnology.org).
73. CWC - Composite Wood Council; (See CPA).
74. DASMA - Door and Access Systems Manufacturers Association; [www.dasma.com](http://www.dasma.com).
75. DHA - Decorative Hardwoods Association; (Formerly: Hardwood Plywood & Veneer Association); [www.decorativehardwoods.org](http://www.decorativehardwoods.org).
76. DHI - Door and Hardware Institute; [www.dhi.org](http://www.dhi.org).
77. ECA - Electronic Components Association; (See ECIA).
78. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
79. ECIA - Electronic Components Industry Association; [www.ecianow.org](http://www.ecianow.org).
80. EIA - Electronic Industries Alliance; (See TIA).
81. EIMA - EIFS Industry Members Association; [www.eima.com](http://www.eima.com).
82. EJMA - Expansion Joint Manufacturers Association, Inc.; [www.ejma.org](http://www.ejma.org).
83. EOS/ESD Association; (Electrostatic Discharge Association); [www.esda.org](http://www.esda.org).
84. ESTA - Entertainment Services and Technology Association; (See PLASA).
85. ETL - Intertek (See Intertek); [www.intertek.com](http://www.intertek.com).
86. EVO - Efficiency Valuation Organization; [www.evo-world.org](http://www.evo-world.org).
87. FCI - Fluid Controls Institute; [www.fluidcontrolsinstitute.org](http://www.fluidcontrolsinstitute.org).
88. FGIA - Fenestration and Glazing Industry Alliance; <https://fgiaonline.org>.
89. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); [www.fiba.com](http://www.fiba.com).
90. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); [www.fivb.org](http://www.fivb.org).
91. FM Approvals - FM Approvals LLC; [www.fmapprovals.com](http://www.fmapprovals.com).
92. FM Global - FM Global; (Formerly: FMG - FM Global); [www.fmglobal.com](http://www.fmglobal.com).
93. FRSA - Florida Roofing, Sheet Metal Contractors Association, Inc.; [www.floridarroof.com](http://www.floridarroof.com).
94. FSA - Fluid Sealing Association; [www.fluidsealing.com](http://www.fluidsealing.com).

95. FSC - Forest Stewardship Council U.S.; [www.fscus.org](http://www.fscus.org).
96. GA - Gypsum Association; [www.gypsum.org](http://www.gypsum.org).
97. GANA - Glass Association of North America; (See NGA).
98. GBCI – Green Business Certification Inc.; [www.gbci.org](http://www.gbci.org).
99. GS - Green Seal; [www.greenseal.org](http://www.greenseal.org).
100. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
101. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
102. HPVA - Hardwood Plywood & Veneer Association; (See DHA).
103. IAPSC - International Association of Professional Security Consultants; [www.iapsc.org](http://www.iapsc.org).
104. IAS - International Accreditation Service; [www.iasonline.org](http://www.iasonline.org).
105. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
106. ICC-ES – ICC Evaluation Services; <https://icc-es.org>.
107. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
108. ICPA - International Cast Polymer Association; [www.theicpa.com](http://www.theicpa.com).
109. ICRI - International Concrete Repair Institute, Inc.; [www.icri.org](http://www.icri.org).
110. IEC - International Electrotechnical Commission; [www.iec.ch](http://www.iec.ch).
111. IEEE SA - IEEE Standards Association; <https://standards.ieee.org>.
112. IES - Illuminating Engineering Society; [www.ies.org](http://www.ies.org).
113. IEST - Institute of Environmental Sciences and Technology; [www.iest.org](http://www.iest.org).
114. IGMA - Insulating Glass Manufacturers Alliance; (See FGIA).
115. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.org](http://www.igshpa.org).
116. II - Infocomm International; (See AVIXA).
117. ILI - Indiana Limestone Institute of America, Inc.; [www.ili.ai](http://www.ili.ai).
118. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); [www.intertek.com](http://www.intertek.com).
119. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); [www.isa.org](http://www.isa.org).
120. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); [www.isfanow.org](http://www.isfanow.org).
121. ISO - International Organization for Standardization; [www.iso.org](http://www.iso.org).
122. ITU - International Telecommunication Union; [www.itu.int](http://www.itu.int).
123. KCMA - Kitchen Cabinet Manufacturers Association; [www.kcma.org](http://www.kcma.org).
124. LPI - Lightning Protection Institute; [www.lightning.org](http://www.lightning.org).
125. MBMA - Metal Building Manufacturers Association; [www.mbma.com](http://www.mbma.com).
126. MCA - Metal Construction Association; [www.metalconstruction.org](http://www.metalconstruction.org).
127. MFMA - Maple Flooring Manufacturers Association, Inc.; [www.maplefloor.org](http://www.maplefloor.org).
128. MFMA - Metal Framing Manufacturers Association, Inc.; [www.metalframingmfg.org](http://www.metalframingmfg.org).
129. MHI - Material Handling Industry; [www.mhi.org](http://www.mhi.org).
130. MMPA - Moulding & Millwork Producers Association; [www.wmmpa.com](http://www.wmmpa.com).
131. MPI - Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
132. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; [www.mss-hq.org](http://www.mss-hq.org).
133. NAAMM - National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
134. NACE - NACE International; (National Association of Corrosion Engineers International); [www.nace.org](http://www.nace.org).
135. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
136. NAIMA - North American Insulation Manufacturers Association; [www.naima.org](http://www.naima.org).
137. NALP - National Association of Landscape Professionals; [www.landscapeprofessionals.org](http://www.landscapeprofessionals.org).
138. NBGQA - National Building Granite Quarries Association, Inc.; [www.nbgqa.com](http://www.nbgqa.com).
139. NBI - New Buildings Institute; [www.newbuildings.org](http://www.newbuildings.org).
140. NCAA - National Collegiate Athletic Association (The); [www.ncaa.org](http://www.ncaa.org).
141. NCMA - National Concrete Masonry Association; [www.ncma.org](http://www.ncma.org).



142. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
143. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
144. NeLMA - Northeastern Lumber Manufacturers Association; [www.nelma.org](http://www.nelma.org).
145. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
146. NETA - InterNational Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
147. NFHS - National Federation of State High School Associations; [www.nfhs.org](http://www.nfhs.org).
148. NFPA - National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
149. NFPA - NFPA International; (See NFPA).
150. NFRC - National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org).
151. NGA - National Glass Association (The); (Formerly: Glass Association of North America); [www.glass.org](http://www.glass.org).
152. NHLA - National Hardwood Lumber Association; [www.nhla.com](http://www.nhla.com).
153. NLGA - National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org).
154. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
155. NOMMA - National Ornamental & Miscellaneous Metals Association; [www.nomma.org](http://www.nomma.org).
156. NRCA - National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
157. NRMCA - National Ready Mixed Concrete Association; [www.nrmca.org](http://www.nrmca.org).
158. NSF - NSF International; [www.nsf.org](http://www.nsf.org).
159. NSI - National Stone Institute; [www.naturalstoneinstitute.org](http://www.naturalstoneinstitute.org).
160. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
161. NSSGA - National Stone, Sand & Gravel Association; [www.nssga.org](http://www.nssga.org).
162. NTMA - National Terrazzo & Mosaic Association, Inc. (The); [www.ntma.com](http://www.ntma.com).
163. NWFA - National Wood Flooring Association; [www.nwfa.org](http://www.nwfa.org).
164. NWRA - National Waste & Recycling Association; [www.wasterecycling.org](http://www.wasterecycling.org).
165. PCI - Precast/Prestressed Concrete Institute; [www.pci.org](http://www.pci.org).
166. PTI - Post-Tensioning Institute; [www.post-tensioning.org](http://www.post-tensioning.org).
167. PDI - Plumbing & Drainage Institute; [www.pdionline.org](http://www.pdionline.org).
168. PLASA - PLASA; [www.plasa.org](http://www.plasa.org).
169. PLIB - Pacific Lumber Inspection Bureau; [www.plib.org](http://www.plib.org).
170. PVCPA - Uni-Bell PVC Pipe Association; [www.uni-bell.org](http://www.uni-bell.org).
171. RCSC - Research Council on Structural Connections; [www.boltcouncil.org](http://www.boltcouncil.org).
172. RESNET – Residential Energy Services Network; [www.resnet.us](http://www.resnet.us).
173. RFCI - Resilient Floor Covering Institute; [www.rfci.com](http://www.rfci.com).
174. RIS - Redwood Inspection Service; [www.redwoodinspection.com](http://www.redwoodinspection.com).
175. SAE - SAE International; [www.sae.org](http://www.sae.org).
176. SCTE - Society of Cable Telecommunications Engineers; [www.scte.org](http://www.scte.org).
177. SDI - Steel Deck Institute; [www.sdi.org](http://www.sdi.org).
178. SDI - Steel Door Institute; [www.steeldoor.org](http://www.steeldoor.org).
179. SEFA - Scientific Equipment and Furniture Association (The); [www.sefalabs.com](http://www.sefalabs.com).
180. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
181. SIA - Security Industry Association; [www.siaonline.org](http://www.siaonline.org).
182. SJI - Steel Joist Institute; [www.steeljoist.org](http://www.steeljoist.org).
183. SMA - Screen Manufacturers Association; [www.smainfo.org](http://www.smainfo.org).
184. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; [www.smacna.org](http://www.smacna.org).
185. SMPTE - Society of Motion Picture and Television Engineers; [www.smpte.org](http://www.smpte.org).
186. SPFA - Spray Polyurethane Foam Alliance; [www.sprayfoam.org](http://www.sprayfoam.org).
187. SPIB - Southern Pine Inspection Bureau; [www.spib.org](http://www.spib.org).
188. SPRI - Single Ply Roofing Industry; [www.spri.org](http://www.spri.org).
189. SRCC - Solar Rating & Certification Corporation; [www.solar-rating.org](http://www.solar-rating.org).
190. SSINA - Specialty Steel Industry of North America; [www.ssina.com](http://www.ssina.com).
191. SSPC - SSPC: The Society for Protective Coatings; [www.sspc.org](http://www.sspc.org).

192. STI/SPFA - Steel Tank Institute/Steel Plate Fabricators Association; [www.steeltank.com](http://www.steeltank.com).
193. SWI - Steel Window Institute; [www.steelwindows.com](http://www.steelwindows.com).
194. SWPA - Submersible Wastewater Pump Association; [www.swpa.org](http://www.swpa.org).
195. TCA - Tilt-Up Concrete Association; [www.tilt-up.org](http://www.tilt-up.org).
196. TCIA – Tree Care Industry Association; [www.treecareindustryassociation.org](http://www.treecareindustryassociation.org).
197. TCNA - Tile Council of North America, Inc.; [www.tileusa.com](http://www.tileusa.com).
198. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.tema.org](http://www.tema.org).
199. TIA - Telecommunications Industry Association (The); [www.tiaonline.org](http://www.tiaonline.org).
200. TMS - The Masonry Society; [www.masonrysociety.org](http://www.masonrysociety.org).
201. TPI - Truss Plate Institute; [www.tpinst.org](http://www.tpinst.org).
202. TPI - Turfgrass Producers International; [www.turfgrasssod.org](http://www.turfgrasssod.org).
203. TRI - Tile Roofing Institute; [www.tilerroofing.org](http://www.tilerroofing.org).
204. UL - Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
205. UL LLC - UL LLC; [www.ul.com](http://www.ul.com).
206. USAV - USA Volleyball; [www.usavolleyball.org](http://www.usavolleyball.org).
207. USGBC - U.S. Green Building Council; [www.usgbc.org](http://www.usgbc.org).
208. USITT - United States Institute for Theatre Technology, Inc.; [www.usitt.org](http://www.usitt.org).
209. WA - Wallcoverings Association; [www.wallcoverings.org](http://www.wallcoverings.org).
210. WCLIB - West Coast Lumber Inspection Bureau; [www.wclib.org](http://www.wclib.org).
211. WCMA - Window Covering Manufacturers Association; [www.wcmanet.org](http://www.wcmanet.org).
212. WDMA - Window & Door Manufacturers Association; [www.wdma.com](http://www.wdma.com).
213. WI - Woodwork Institute; [www.wicnet.org](http://www.wicnet.org).
214. WSRCA - Western States Roofing Contractors Association; [www.wsrca.com](http://www.wsrca.com).
215. WWPA - Western Wood Products Association; [www.wwpa.org](http://www.wwpa.org).

- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; [www.din.de](http://www.din.de).
2. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
3. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
4. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).

- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. CPSC - Consumer Product Safety Commission; [www.cpsc.gov](http://www.cpsc.gov).
2. DOC - Department of Commerce; National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
3. DOD - Department of Defense; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
4. DOE - Department of Energy; [www.energy.gov](http://www.energy.gov).
5. DOJ - U.S. Department of Justice; [www.ojp.usdoj.gov](http://www.ojp.usdoj.gov).
6. DOS - U.S. Department of State; [www.state.gov](http://www.state.gov).
7. EPA - Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
8. FAA - Federal Aviation Administration; [www.faa.gov](http://www.faa.gov).
9. GPO - U.S. Government Publishing Office; [www.gpo.gov](http://www.gpo.gov).
10. GSA - General Services Administration; [www.gsa.gov](http://www.gsa.gov).
11. HUD - Department of Housing and Urban Development; [www.hud.gov](http://www.hud.gov).
12. LBNL - Lawrence Berkeley National Laboratory; Energy Technologies Area; [www.lbl.gov/](http://www.lbl.gov/).

13. NIST - National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
  14. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).
  15. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; [www.trb.org](http://www.trb.org).
  16. USACE - U.S. Army Corps of Engineers; [www.usace.army.mil](http://www.usace.army.mil).
  17. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; [www.ars.usda.gov](http://www.ars.usda.gov).
  18. USDA - Department of Agriculture; Rural Utilities Service; [www.usda.gov](http://www.usda.gov).
  19. USP - U.S. Pharmacopeial Convention; [www.usp.org](http://www.usp.org).
  20. USPS - United States Postal Service; [www.usps.com](http://www.usps.com).
- D. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. SCO; State Construction Office, Raleigh, North Carolina.
- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; [www.govinfo.gov](http://www.govinfo.gov).
  2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
  3. DSCC - Defense Supply Center Columbus; (See FS).
  4. FED-STD - Federal Standard; (See FS).
  5. USAB - United States Access Board; [www.access-board.gov](http://www.access-board.gov).
  6. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

## **PART 2 - PRODUCTS**

**NOT USED**

## **PART 3 - EXECUTION**

**NOT USED**

**END OF SECTION**



## **SECTION 014216**

### **DEFINITIONS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Definitions.

##### **1.2 DEFINITIONS**

- A. Approved: When used to convey Architect's action on Contractor's submittals and requests, "approved" is limited to Architect's duties and responsibilities as stated in the general conditions of the contract for construction.
- B. By Owner (B.O.): Items that will be ordered, paid for, and shipped to the Project site by the Owner. The Contractor shall receive, unload, unpack or uncrate, protect, move into place, install, and connect items as specified or indicated in the Contract Documents.
- C. Day: When used without further clarification, a day is a calendar day consisting of 24 consecutive hours.
- D. Directed: An instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- E. Furnish, or Supply: Pay for, deliver to Project site, unload, unpack, inspect, and store as specified or directed while retaining care, custody, and control until received for installation.
- F. Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- G. Install: Receive, temporarily store, unpack, assemble, apply, erect, set or place in position, make any required connections, finish, cure, protect, clean, and, as applicable, adjust and test for satisfactory performance and operation at Project site.
- H. Not In Contract (NIC): Products not in Contract, but which may require provisions in the construction for the future installation as specified or indicated in the Contract Documents.
- I. Project Site: Space available for performing construction activities, the extent of which is indicated on Drawings and may or may not be identical with the description of the land on which Project is to be built.

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- J. Provide: Furnish and install, or supply and install, including without limitation, all labor, materials, equipment, transportation, services, and other items required to complete reference Work, ready for intended use.
- K. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- L. Relocate Existing (R.E.): Existing items which require relocation under the Contract and which may require utility or other service disconnection and capping, and new utility or other service connections when specified or indicated in the Contract Documents.

## **PART 2 - PRODUCTS**

**NOT USED**

## **PART 3 - EXECUTION**

**NOT USED**

**END OF SECTION**

## **SECTION 016000**

### **PRODUCT REQUIREMENTS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

A. Section Includes:

1. Administrative and procedural requirements for selection of products for use in Project.
2. Product delivery, storage, and handling.
3. Manufacturers' standard warranties on products.
4. Special warranties.
5. Comparable products.

B. Related Requirements:

1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
2. Section 012500 "Substitution Procedures" for administrative and procedural requirements for substitutions, including definition and limitations on substitutions.
3. Section 014200 "References" for applicable industry standards for products specified.
4. Section 017700 "Closeout Procedures" for submitting warranties.

##### **1.2 DEFINITIONS**

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "assembly," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis of design" or "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
  1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
  2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

### **1.3 QUALITY ASSURANCE**

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
  1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
  2. Equipment Nameplates: Provide a permanent nameplate on each item of service equipment or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
    - a. Name of product and manufacturer.
    - b. Model and serial number.
    - c. Capacity.
    - d. Speed.
    - e. Ratings.
  3. See individual identification Sections in Divisions 21, 22, 23, 26 and 27 for additional equipment identification requirements.



#### **1.4 COORDINATION**

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

#### **1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism.
  - 1. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.
  - 5. Maintain product delivery slips and bills of lading for one year after final completion, and furnish to Owner upon request.
- C. Storage:
  - 1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
  - 2. Store products to allow for inspection and measurement of quantity or counting of units.
  - 3. Store materials in a manner that will not endanger Project structure.
  - 4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
  - 5. Protect liquids from freezing.
  - 6. Protect asphalt-based products and foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  - 7. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  - 8. Protect stored products from damage.

#### **1.6 PRODUCT WARRANTIES**

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  - 1. See individual Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Comply with Section 017700 "Closeout Procedures" for submittal of warranties.

## **PART 2 - PRODUCTS**

### **2.1 PRODUCT SELECTION PROCEDURES**

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  - 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
  - 4. Where products are accompanied by the term "as selected," Architect will make selection.
  - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
  - 6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
    - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products.
    - b. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.
- B. Product Selection Procedures:
  - 1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    - a. Sole product may be indicated by the phrase "Provide the following:".
  - 2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    - a. Sole manufacturer/source may be indicated by the phrase "Provide products by the following:".
  - 3. Basis-of-Design Product: Where Specifications name a product as "basis of design", or refer to a product indicated on Drawings, and include a list of manufacturers or products,

provide the specified "basis of design" product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, performance, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of a product by one of the other named manufacturers.

- a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience, if substitutions for convenience are allowed.
4. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    - a. Limited list of products may be indicated by the phrase "Provide one of the following:".
  5. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
    - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following:".
    - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
  6. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    - a. Limited list of manufacturers is indicated by the phrase "Provide products by one of the following:".
  7. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
    - a. Non-limited list of manufacturers is indicated by the phrase "Available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following:".
    - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
- C. Visual Matching Specification: Where Specifications include the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with

requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## **2.2 COMPARABLE PRODUCTS**

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."
1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
  2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements.
1. Comply with specified submittal requirements.

## **PART 3 - EXECUTION**

### **NOT USED**

## **END OF SECTION**

## **SECTION 017300**

### **EXECUTION**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. General administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
    - a. Installation of the Work.
    - b. Progress cleaning.
    - c. Protection of installed construction.
    - d. Correction and repair of Work.
- B. Related Requirements:
  - 1. Section 017700 "Closeout Procedures" for final cleaning.

##### **1.2 QUALITY ASSURANCE**

- A. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

#### **PART 2 - PRODUCTS**

##### **2.1 MATERIALS**

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned.
  - 1. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
- B. Cleaning Agents: Use cleaning products that comply with one of the following standards:
  - 1. Green Seal GS-37, for general-purpose, bathroom, glass and carpet cleaners used for industrial and institutional purposes.
  - 2. Green Seal GS-40, for industrial and institutional floor care products.
  - 3. Green Seal GS-52/53, for specialty cleaning products.
  - 4. UL EcoLogo 2792 (formerly CCD 110), for cleaning and degreasing compounds.
  - 5. UL EcoLogo 2759 (formerly CCD 146), for hard-surface cleaners.
  - 6. UL EcoLogo 2795 (formerly CCD 148), for carpet and upholstery care.
  - 7. UL EcoLogo 2777 (formerly CCD 147), for hard-floor care.

8. EPA Safer Choice Standard.

C. Vacuums: Units bearing the Carpet and Rug Institute (CRI) Seal of Approval.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with installer present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
  2. List of detrimental conditions, including substrates.
  3. List of unacceptable installation tolerances.
  4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### **3.2 PREPARATION**

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before

fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

### **3.3 INSTALLATION**

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Maintain minimum ceiling and headroom clearances indicated on Drawings. At unoccupied spaces without ceilings, provide a minimum clear height of 8 feet, unless otherwise indicated on Drawings.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect.
  - 1. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed.
  - 1. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work.

1. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
  2. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  3. Allow for building movement, including thermal expansion and contraction.
  4. Coordinate installation of anchorages.
    - a. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
    - b. Deliver such items to Project site in time for installation.
- I. Joints:
1. Make joints of uniform width.
  2. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect.
  3. Fit exposed connections together to form hairline joints.

### **3.4 PROGRESS CLEANING**

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 degrees F.
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed Work clean.
1. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.



- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal:
  - 1. Do not bury or burn waste materials on-site.
  - 2. Do not wash waste materials down sewers or into waterways.
  - 3. Remove food waste from Project site at the end of each work day.
  - 4. Comply with requirements for waste disposal facilities in Section 015000 "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place.
  - 1. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period.
  - 1. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### **3.5 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

### **3.6 CORRECTION AND REPAIR OF WORK**

- A. Repair or remove and replace damaged, defective, or nonconforming Work.
  - 1. Repair, or remove and replace, damaged existing construction and permanent facilities to original condition.
  - 2. Remove and replace damaged and defective Work as soon as defects are discovered to ensure proper installation sequence of subsequent Work.
- B. Repairs: Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
  - 1. Touch up and otherwise repair and restore damaged and marred finishes and surfaces.
    - a. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
  - 2. Repair components that do not operate properly.

- a. Remove and replace operating components that cannot be repaired.
- 3. Remove and replace Work that cannot be repaired to condition acceptable to Owner or Architect.
- C. Replacement: Replace damaged Work where repairs are not possible, where repairs will negatively impact the sequencing or schedule of subsequent Work, or where restoration or repairs are not acceptable to Owner or Architect.
  - 1. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
  - 2. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 3. Replace finishes and surfaces that show evidence of repair or restoration.
  - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
  - 5. Replace filters in mechanical units with new filters.
- D. Restore permanent facilities used during construction to their specified conditions.

**END OF SECTION**

## **SECTION 017823**

### **OPERATION AND MAINTENANCE DATA**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

A. Section Includes:

1. Administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - a. Operation and maintenance documentation directory manuals.
  - b. Emergency manuals.
  - c. Systems and equipment operation manuals.
  - d. Systems and equipment maintenance manuals.
  - e. Fire-rated assemblies maintenance manuals.
  - f. Product maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Section 019100 "Commissioning" for verification and compilation of data into operation and maintenance manuals.

##### **1.2 DEFINITIONS**

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction; an assembly.
- B. Subsystem: A portion of a system with characteristics similar to a system.

##### **1.3 CLOSEOUT SUBMITTALS**

A. Submit operation and maintenance manuals indicated.

1. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of individual Specification Section's submittals.
2. Submit reviewed manual content formatted and organized as required by this Section.
3. Architect and Owner's Commissioning Authority will comment on whether content of operation and maintenance submittals is acceptable.
4. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:

1. Submit electronic files by uploading to construction document management software system.
    - a. Enable reviewer comments on draft submittals.
  2. Submit three paper copies. Architect will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 60 days before commencing demonstration and training.
1. Architect and Owner's Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training.
1. Architect and Owner's Commissioning Authority will return copy with comments.
  2. Correct or revise each manual to comply with Architect's and Owner's Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Owner's Commissioning Authority's comments and prior to commencing demonstration and training.
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

#### **1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS**

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available.
    - a. Where scanning of paper documents is required, enable optical character recognition, and configure resolution of scanned file so document is legible but with minimum file size.
  2. File Names and Bookmarks:
    - a. Bookmark individual documents based on file names.
    - b. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents.
    - c. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree.
    - d. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit hard-copy manuals in bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

- a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components.
    - 1) Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
  - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project name, subject matter of contents, and indicate Specification Section number on bottom of spine.
    - 1) Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents.
    - a. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
    - a. Enclose title pages and directories in clear plastic sleeves.
  4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
  5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual.
    - c. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## **1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS**

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not otherwise part of a system.
  1. Each manual shall contain the following materials, in the order listed:
    - a. Title page.
    - b. Table of contents.
    - c. Manual contents.
- B. Title Page: Include the following information:
  1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
  6. Name and contact information for Architect.
  7. Name and contact information for Owner's Commissioning Authority.
  8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  9. Cross-reference to related systems in other operation and maintenance manuals.

- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents:
  - 1. Organize into sets of manageable size.
  - 2. Arrange contents alphabetically by system, subsystem, and equipment.
  - 3. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents.
  - 1. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

## **1.6 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL**

- A. Operation and Maintenance Documentation Directory:
  - 1. Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
  - 2. List items and their location to facilitate ready access to desired information.
  - 3. Include the following:
    - a. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
    - b. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
    - c. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

## **1.7 EMERGENCY MANUALS**

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
  - 1. Type of emergency.
  - 2. Emergency instructions.
  - 3. Emergency procedures.

- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  - 1. Fire.
  - 2. Flood.
  - 3. Gas leak.
  - 4. Water leak.
  - 5. Power failure.
  - 6. Water outage.
  - 7. System, subsystem, or equipment failure.
  - 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
  - 1. Instructions on stopping.
  - 2. Shutdown instructions for each type of emergency.
  - 3. Operating instructions for conditions outside normal operating limits.
  - 4. Required sequences for electric or electronic systems.
  - 5. Special operating instructions and procedures.

## **1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS**

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not otherwise part of a system.
  - 1. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
  - 2. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 3. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  - 2. Performance and design criteria if Contractor has delegated design responsibility.
  - 3. Operating standards.
  - 4. Operating procedures.
  - 5. Operating logs.
  - 6. Wiring diagrams.
  - 7. Control diagrams.
  - 8. Piped system diagrams.
  - 9. Precautions against improper use.
  - 10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where used for identification.

## 1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not otherwise part of a system.

1. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
2. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
3. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system.

1. Include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.



- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents.
  - 1. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed.
  - 2. Mark each sheet to identify each product or component incorporated into the Work.
  - 3. If data includes more than one item in a tabular format, identify each item using appropriate references from the Contract Documents.
  - 4. Identify data applicable to the Work and delete references to information not applicable.
    - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
  - 5. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 6. Identification and nomenclature of parts and components.
  - 7. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.
  - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - 5. Aligning, adjusting, and checking instructions.
  - 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.
- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams.
  - 1. Coordinate these drawings with information contained in record drawings to ensure correct illustration of completed installation.
  - 2. Do not use original project record documents as part of maintenance manuals.

#### **1.10 FIRE-RATED ASSEMBLIES MAINTENANCE MANUALS**

- A. Fire-Rated Assemblies Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance for each type of fire-rated assembly, including fire-rated walls, fire-rated partitions, smoke barriers, smoke partitions, fire-rated door openings, fire-rated glazing, spray-applied fire-resistive materials, intumescent fire-resistive materials, firestopping, fireblocking, and draftstopping assemblies.
- B. Content: Organize manual into a separate section for each assembly, product, or material.
  - 1. Include source information, product information, maintenance procedures, repair materials and sources, as described below.
- C. Source Information: List each product included in manual, identified by product manufacturer and product name, and arranged to match manual's table of contents.
  - 1. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual, Drawing sheet number, and schedule designation or identifier, where applicable.
- D. Product Information: Include the following, as applicable:
  - 1. Manufacturer's name.
  - 2. Product name and model number.
  - 3. Type and length of fire-rating.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- E. Fire-Rated Assemblies: Diagram plan and section locations and types of fire-rated assemblies as installed.
  - 1. Identify fire-rating classification, in minutes, with color-coding on plans and sections.
- F. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.

- a. Include blank log for recording inspection and maintenance of fire-rated assemblies.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions to maintain fire ratings.
- G. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

#### **1.11 PRODUCT MAINTENANCE MANUALS**

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish.
- 1. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents.
- 1. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual, Drawing sheet number, and schedule designation or identifier, where applicable.
- D. Product Information: Include the following, as applicable:
- 1. Manufacturer's name.
  - 2. Product name and model number.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
- 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

## **PART 2 - PRODUCTS**

**NOT USED**

## **PART 3 - EXECUTION**

**NOT USED**

**END OF SECTION**

## **SECTION 23 0500 – GENERAL MECHANICAL REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. All work shall be subject to the General Conditions and shall comply with applicable requirements of the Contract.
- B. This Section, "23 0500", governs all requirements as applicable to the mechanical work specified in other Sections of Division 23.

#### **1.2 DIVISION OF RESPONSIBILITY**

- A. The requirements under Section 23 0500 are intended for the party or parties who have been duly awarded the applicable portion of work to be performed under the indexed sections of Division 23 also known as the Heating, Ventilating and Air Conditioning Work, Fire Protection and Sprinkler Work.

#### **1.3 REFERENCE STANDARDS**

- A. Compliance with the following codes and standards shall be required as applicable:

ADC	Air Diffusion Council
AGA	American Gas Association
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing Materials
AWWA	American Water Works Association
DOE	United States Department of Energy
EPA	United States Environmental Protection Agency
FM	Factory Mutual
MSS	Manufacturer's Standardization Society of the Valve and Fitting Industry
NACE	National Association of Corrosion Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NCBC	North Carolina Building Code
NCFC	North Carolina Fire Code
NCMC	North Carolina Mechanical Code

NCEC	North Carolina Energy Code
OSHA	Occupational Safety and Health Act
OTCR	Office of Technical Certification and Research (BSA & MEA)
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
TEMA	Tubular Exchanger Manufacturers Association
UL	Underwriters' Laboratories, Inc.
USAS	USA Standards Institute (Formerly ASA)
USGBC	United States Green Building Council

- B. Conform to materials and equipment rating standards, listings or classifications of the above organizations as well as ratings, listings or classifications accepted under local codes and laws.

#### 1.4 ABBREVIATIONS

- A. In addition to those listed below, meanings of common abbreviations used in text of Division 23 of the Project Specifications are tabulated in ASHRAE Handbook, "Fundamentals", latest edition.
- B. Project Abbreviations:

AC	Air Conditioning
AHJ	Authority Having Jurisdiction
ATC	Automatic Temperature Control
AWG	American Wire Gauge
B & S	Brown & Sharpe
BMS	Building Management System
BTU	British Thermal Units
BWG	Birmingham Wire Gauge
C	Degrees Celsius
CFM	Cubic Feet per Minute
CM	Construction Manager
F	Degrees Fahrenheit
GC	General Contractor
GPM	Gallons per Minute
H & V	Heating and Ventilating
HVAC	Heating, Ventilating and Air Conditioning
IBBM	Iron Body Brass Mounted
LB	Pound (Also shown as: #)
MBH	Thousand BTU per hour
MER	Mechanical Equipment Room
mm	Millimeter
#	Number
OS & Y	Outside Screw and Yoke
PRV	Pressure Reducing Valve
PSIG	Pounds per Square Inch Gauge
SP	Static Pressure
USS	United States Standard
WG	Water Gage
WSP	Working Steam Pressure

See Drawings for additional abbreviations

## 1.5 DEFINITIONS

- A. "Provide" means furnish and install, complete, the specified material, equipment or other item and perform all required labor to make a finished installation.
- B. "Furnish and install" has the same meaning as given above for "Provide."
- C. "Furnish" means supply the specified material, equipment or other items.
- D. "Install" means provide all labor required to make a finished and complete installation.
- E. "Engineer" or "Architect" means the authorized representative of the Owner.
- F. Refer to General Conditions for other definitions.

## 1.6 REVIEW OF CONTRACT DOCUMENTS AND SITE

- A. With the submission of his Bid, Contractor shall give written notice to the Owner of any materials or apparatus believed in-adequate or unsuitable, in violation of laws, ordinances, rules or regulations of Authorities Having Jurisdiction, and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that the Contractor has included the cost of all required items in his Proposal for a complete project.
- B. Contractor shall acknowledge that he has examined the Plans, Specifications and Site, and that from his own investigations he has satisfied himself as to the nature and location of the work; the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials; availability of labor, water, electric power, roads and uncertainties of weather; the conformation and condition of the ground; the character, quality and quantity of surface and subsurface materials to be encountered; the character of equipment and facilities needed preliminary to and during the execution of the work; all federal, state, city county, township and municipal laws, ordinances and regulations particularly those relating to employment of labor, rates of wages, and construction methods; and all other matters which can in any way affect the work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with the available information concerning these conditions will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work.
- C. Owner assumes no responsibility for any understanding or representation made during or prior to the negotiation and execution of this Contract unless such understanding or representations are expressly stated in the Contract, and the Contract expressly provides that the responsibility, therefore, is assumed by the Owner.

## 1.7 BID DOCUMENTS

- A. The drawings show the general layout of the various items of equipment; however, layout of equipment, accessories, specialties, ducts, plenums and piping systems are diagrammatic unless specifically dimensioned, and do not necessarily indicate every required fitting, support or similar items required for a complete installation. Consult the architectural drawings and details for exact locations of fixtures and equipment located in finished construction and/or surfaces. Where same is not definitively located, obtain the information from the Architect

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before proceeding by submitting a dimensioned submittal for review. Any reasonable changes in locations indicated shall be made by this Contractor without additional cost to the Owner.

- B. The Contractor shall follow the drawings in laying out the work and check drawings of all trades to verify spaces in which work shall be installed. Maintain maximum headroom and where space conditions appear inadequate, the Architect shall be notified before proceeding with the installation.
- C. In general, specifications describe quality and type of material and equipment.
- D. The drawings show the various systems schematically. No added compensation shall be granted for variations due to field conditions or resulting from coordination with other trade Contractors working under other divisions of the specifications and/or design documents.
- E. Work that is reasonably inferable scope of work not shown on the drawings but called for in the specifications, or vice versa, shall be provided by the Contractor without additional expense to the Owner.
- F. Where variance occurs between the drawings and specifications, or within either document itself, the Contractor shall request, through the Construction Manager, clarification in writing from the Architect and/or Engineer as to which item and manner in the work shall be installed.
- G. The commercially standard items of equipment and the specified names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- H. Equipment shown on the drawings with particular manufacturers identified has been coordinated for structural penetrations, electrical connection, operating and service (maintenance) requirements, and physical size with regard to the space where the equipment is shown. If they comply with the project specifications, these and the other specified manufacturers of this equipment shall be acceptable, contingent on the Contractor providing a complete installation and maintaining full responsibility to provide, at no additional cost, any modifications to the structure or electrical service that are required to properly install, operate and service the equipment being used. These modifications shall not include additional area for equipment unless approved by the Architect.
  - 1. The Contractor shall note these changes on the equipment submittal and shall show all differences in equipment being supplied from that shown on the drawings. Failure of the Contractor to provide this information with the submittal shall indicate the submitted equipment meets or exceeds in performance the equipment shown on the drawings and is physically no larger than the equipment specified.
- I. Failure of the Contractor to comply with the above and any discrepancy found shall result in the Contractor providing equipment equal to that specified at the Contractor's expense.

## 1.8 MEASUREMENTS

- A. Contractor shall base all his measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. He shall verify all measurements at site; and check the correctness of same as related to the work.



#### 1.9 SPACE LIMITATIONS

- A. The equipment selections used in the preparation of the Construction Documents shall fit into the physical spaces provided and indicated, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearance in accordance with Code requirements, the requirements of the local Authorities Having Jurisdiction and the equipment manufacturer's recommendations.
- B. In the preparation of drawings, a reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made; however, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, Code-required access and proper fit rests with the Contractor.
- C. Physical dimensions and arrangements of equipment to be installed shall be subject to the Architect's and Engineer's review.
- D. Coordinate the installation of equipment, ductwork, conduit, bus duct, piping, cable, cable trays, etc., installation with lighting fixtures, special ceiling construction, air distribution equipment and the structure. Provide additional rises, drops and offsets as required. If, after installed, new ductwork, conduit, bus duct, piping or cable is found to be in conflict with the architecture, structure or other trade work which is either existing or shown on the Construction Documents, the ductwork, conduit, bus duct, piping or cable shall be relocated without additional cost to the Owner.
- E. The Contractor shall follow the drawings in laying out the work and check drawings of all trades to verify spaces in which work shall be installed. Maintain maximum headroom and, where space conditions appear inadequate, the Architect and Engineer shall be notified before proceeding with the installation.

#### 1.10 LABOR AND MATERIALS

- A. All materials and apparatus required for the work shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces.
- B. Contractor shall remove all materials delivered, or work erected, which does not comply with Contract Drawings and Specifications, and replace with proper materials, or correct such work as directed, at no additional cost to the Owner.

#### 1.11 COVERING OF WORK

- A. No pipe, fitting, or other work of any kind shall be covered up or hidden from view before it has been examined or approved by the Engineer, Architect, and/or other Authority Having Jurisdiction over same. Any unacceptable work, or unauthorized or disapproved materials discovered shall be removed and corrected immediately.
- B. Any type of equipment shown or specified to be installed outdoors, on grade, on roof or similar areas shall have appropriate protection against outdoor weather. Equipment such as motors, panels, etc. shall have rain hood or appropriate protection as provided under Division 23. Insulated pipes shall have aluminum covers or as specified. Insulated ducts shall be provided

with aluminum jacket with overlapping, sealed joints. Uninsulated ducts shall be soldered joints and seams or as specified. Where no protection is feasible, such as in exposed vibration springs, hangers, pipe or steel members, such items shall be rated by the manufacturer for outdoor use or as approved by the Architect.

#### 1.12 PROTECTION

- A. Contractor shall protect the work and material of all trades from damage by his work or workmen and shall replace all damaged material with new.
- B. Contractor shall be responsible for work and equipment until his work is finally inspected, tested, and accepted; he shall protect his work against theft, injury or damage; and carefully store material and equipment received on site which is not immediately installed; close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing material.
- C. Contractor shall be responsible for the preservation of all public and private property, along and adjacent to the work, and shall use every precaution necessary to prevent damage or injury thereto. He shall use suitable precautions to prevent damage to pipes, conduits and other underground structures or utilities, and shall carefully protect from disturbance or damage all property marks until an authorized agent has witnessed or otherwise referenced their location, and shall not remove them until directed.
- D. All mechanical and electrical equipment delivered to the site shall have appropriate wrapping to protect them from rain, flood, wind, construction debris and all types of water damage normally encountered at the construction sites. Protection of equipment such as fans, coils, valves and similar equipment shall be the responsibility of the Contractor receiving such equipment at the jobsite for installation under Division 23 Contract.

#### 1.13 COMPLETE PERFORMANCE OF WORK

- A. This Contractor, under this section of the specifications, shall provide all labor, materials, supervision, supplies, tools, scaffolding, machinery, equipment, appliances and services (including transportation, rigging, storage utilities, etc.) and all required permits and licenses necessary to complete the work under this Contract. All systems and equipment shall be complete in every respect and all items of material, equipment and labor shall be furnished, installed, tested and commissioned for a fully operational system.
- B. This Contractor shall coordinate his work with the work of the other trades so as to resolve conflicts without impeding job progress or the project construction schedule. Provide notice with the bid proposal of any concrete work required by this section that is not indicated on the structural or architectural drawings or drawings of other trades.
- C. This Contractor shall examine all Construction Documents for all sections of the specifications in order to determine the extent of work required to be completed under this section. Failure to examine all the Construction Documents for this project shall not relieve this Contractor of the responsibility to perform all the work required for a complete, fully operational and satisfactory installation.
- D. Work shall be executed in strict accordance with the best practice of the trades in a thorough, workmanlike manner by competent, skilled technicians and trade personnel.

- E. This Contractor shall provide a competent, experienced full-time Superintendent who is authorized to make decisions on behalf of the Contractor.
- F. All labor, materials, apparatus and appliances essential to the complete and proper functioning of the systems described and/or indicated herein, or which may be reasonably implied as essential, whether mentioned in the Contract Drawings and specifications or not, shall be furnished and installed by the Contractor. The entire installation shall be ready in every respect for the satisfactory and efficient operation when completed.
- G. In cases of doubt as to the work intended, or in the event of need for explanation thereof, request supplementary written instructions in the form of a Request For Information (RFI) from the Architect and/or Engineer.
- H. Prior to commencing with the fabrication and/or installation, shop drawings must be prepared and approved, and the work specified herein and shown on the Contract Drawings must be coordinated with all other trades.
- I. This Contractor shall be responsible for material and workmanship until completion and final acceptance. Replace any of same which may be damaged, lost or stolen, without additional cost to Owner. Guard the building and its contents against damage by this Contractor, his employees or Subcontractors, and make good any damage free of charge.
- J. Where, due to union regulations or trade agreements, any of the work shown on the drawings or specified herein is not considered this trade's work, subcontract the work in question, but assume full responsibility for the complete installation. Except for such changes as may be specifically approved by the Architects and Consulting Engineers, in accordance with alternates or options stated hereinafter, all work must be in full accordance with the intent of the plans and specifications, complete in every way and ready for satisfactory and efficient operation when delivered to the Owner.
- K. Provide signs required by the Authorities Having Jurisdiction.
- L. Provide all rigging required for complete installation and furnish drawings showing necessary points of support, reactions and supplementary bracing. This shall be submitted for approval by Owner. Should any shoring be required, provide same after Owner's approval. Rigging plan shall be provided to the Engineer and Owner for review prior to scheduling rigging.
- M. Become thoroughly acquainted with the work involved, and obtain and verify at the building all measurements necessary for the proper installation of work. Furnish to other Contractors any information relating to work of this division necessary for the proper installation of their Contracts. Confer with other Contractors for finish adjacent to work of this division and arrange to have visible portions of the work (such as access doors, grilles, escutcheons, etc.) fit in with the finish in a manner satisfactory to the Owner, Architect and Engineer.
- N. Certain materials may be furnished, installed or furnished and installed under other sections of the specifications. Examine the Construction Documents to ascertain these requirements.
- O. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto. Finished suspended ceiling elevations are indicated on the General Construction Drawings.

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- P. Transmit to trades doing work of other divisions all information required for work to be provided under their respective divisions (such as water connections, foundations, electric wiring, access doors and the like) in ample time for installation.
- Q. Wherever this Contractor's work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to ensure that all Contractors have the information necessary so that they may properly install all the necessary connections and equipment. Identify all work items (valves, dampers, pull boxes, etc.) in an approved manner in order that the other trades may know where to install such items such as access doors, panel, etc.
- R. Where disagreements occur between the plans and the specifications or within either document itself, the item or arrangement of better quality, greater quantity or higher cost shall be included in the Base Bid.
- S. Provide required supports and hangers for piping, ductwork, conduit and equipment, so that loading shall not exceed allowable loadings of structure. Submittal of a bid shall be deemed a representation that the Contractor submitting such bid has ascertained allowable loadings and has included in his estimates the costs associated in furnishing required supports.
- T. Set all inserts in ample time to allow the work of the other trades to be performed on scheduled time.
- U. Furnish and set all sleeves for passage of pipes through structural masonry and concrete walls and floors and elsewhere as required for proper protection of each pipe passing through building surfaces. Coordinate this work with the Construction Manager in order to expedite and properly perform this work.
- V. Field drilling, cutting and/or reinforcing of holes in structural metal deck required for work under this division shall be coordinated through the Construction Manager and approved by the Structural Engineer. All such drilling, cutting and reinforcing costs shall be borne by this Contractor.
- W. Should the Contractor neglect to perform preliminary work and should cutting be required in order to install equipment, the expense of this cutting and restoring of surfaces to their original condition shall be borne by this Contractor.
- X. Architectural drawings shall be checked for ceiling height requirements.
- Y. Due to the type of installation, a fixed sequence of operation is required to properly install the complete systems. It shall be the responsibility of this Contractor to coordinate, protect and schedule his work with other trades in accordance with the construction sequence.

#### 1.14 CUTTING AND PATCHING

- A. Provide all cutting and rough patching required for systems and equipment included in these specifications. All finish patching will be done under General Construction work.
- B. Provide all sleeves and inserts required before the floors and walls are built; Contractor shall pay the cost of cutting and patching required for pipes where sleeves and inserts were not

installed in time, or where incorrectly located. Provide all drilling required for the installation of hangers.

- C. All holes cut through concrete slabs or arches shall be punched or drilled from the underside. No structural members shall be cut without the written approval of the Architect and/or the Structural Engineer and all such cutting shall be done in a manner directed by him.
- D. Contractor shall not do any cutting that may impair strength of building construction. No holes, except for small screws, may be drilled in beams or other structural members without obtaining prior approval. All work shall be done in a neat manner by mechanics skilled in their trades and as approved.
- E. Provide sleeves and fire stopping at piping and ductwork floor, wall and roof penetrations in accordance with recognized standards.

#### 1.15 SUBMITTALS

##### A. Procedure:

- 1. Prepare a schedule of specific submissions at the outset of the Project for the Owner's review and approval; make submissions listed below and in the other Sections of Division 23 of the Project Specifications.
  - a. If submissions listed in other Sections of Division 23 are more specific than those listed below, comply with the more specific requirements.
  - b. Failure of the Contractor to submit Shop Drawings in ample time for checking shall not entitle him to an extension of Contract time, and no claim for extension by reason of such default will be allowed.
  - c. Piecemeal submittals are unacceptable and will not be reviewed. No submittal shall be considered for review, the review of which is contingent upon acceptance of other features for which submittals have not been submitted.
  - d. Submittals from Vendor without Contractor's review and approval stamp will not be reviewed.
  - e. Submittals shall not be used by the Contractor as a means to secure approval of a substitution. Contractor must indicate all deviations, omissions and substitutions in his submittal; if there are none of these 3 exceptions, he shall then state on the submittal: "NO EXCEPTION TAKEN" and it will be assumed to fully comply with the contract documents. Any submittal without stated exceptions, or without statement that no exception is taken will not be reviewed and will be rejected and returned to Contractor for rectification.
  - f. All products of a similar nature (i.e., diffusers, air handling units or variable speed drives) shall be provided by a single manufacturer.

##### B. Shop Drawings:

##### 1. Manufacturer's Drawings:

- a. Submit equipment listed in all applicable Sections - include material specifications, operating characteristics and finishes, specified agency listings or approvals.
- b. Cuts, brochures or other literature submitted for expeditious approval but incomplete or missing items of hardware or software (performance data) shall be re-submitted until all system or equipment components have been reviewed and

approved. Any item not included in the original or first submission shall be considered outstanding work until such item of equipment or work has been submitted or installed in place exactly conforming to the intent of the contract documents.

- c. Contractor shall provide preliminary layout drawings of all major pieces of equipment (i.e., boilers, chillers, cooling towers, air handling units), confirming that the submitted product physically fits within the architectural enclosures. This drawing is required along with the manufacturer's product data.
- d. Contractors shall be responsible for all costs related to substitutions as they affect other contractors.

2. Installation Drawings:

- a. Furnish coordinated drawings of equipment installation, including interconnecting piping and ductwork. Minimum scale for these drawings shall be 3/8 inch equals one foot.
- b. Coordinate space requirements for electrical, plumbing and other trades in the vicinity of work.
- c. Include connections, anchorages and fastenings for piping, conduit and ductwork.
- d. Make allowance for clearances for access to and maintenance of equipment.
- e. Do not install any piping conduits or ductwork, in any area, prior to obtaining approval of its layout by means of submitting shop drawings.
- f. Any missing items of equipment, material or labor, during initial submission of shop drawings, are to be completed and re-submitted for final approval. Shop drawing should not be used as a vehicle for obtaining variances, deviation or omission from the scope of contract documents. Approval of a submittal shall pertain to the portions that conform to the intent of the contract documents.
- g. Submission of any missing, incomplete or otherwise deviant layout is subject to re-submission until all contract requirements have been properly included or shown on the same layout.
- h. Submit drawings indicated on equipment, piping and ductwork loads to structural engineer for review.

C. Reports:

- 1. Compliance with listings and approvals for equipment and for fire ratings.
- 2. Acceptance certificates from inspecting agencies.
- 3. Complete printed and illustrated operating instructions where required in report format.
- 4. Manufacturer's pressure tests on vessels.
- 5. Manufacturer's performance tests on operating equipment.
- 6. Field pipe testing reports.
- 7. Welder's certificates and field test reports.
- 8. Field operating test results for operating equipment.
- 9. Performance report on the balancing of air and water systems.
- 10. Performance reports for vibration isolation equipment.
- 11. Manufacturer's reports on motorized equipment alignment and installation.
- 12. Seismic Installation Reports: Confirming that all installed equipment meets the requirements of the Professional Engineer that is responsible for the Seismic Design.
- 13. Additional reports as noted in other sections.

- D. Specific references to any article, device, product or material, fixture or item of equipment by name, make or catalog number shall be interpreted as establishing a basis of cost and a standard quality. All devices shall be of the make and type listed by Special Agencies, such as

the Underwriters' Laboratories, and where required, approved by the authority having jurisdiction.

- E. Contractor shall be responsible for any deviations in equipment size, motor horsepower and access requirement, from specified products, including coordination with and costs associated with the related work of other Trades.

#### 1.16 COORDINATION

- A. Contractor shall prepare preliminary shop drawings suitable for use in coordinating his work with the work of other trades. The HVAC Section shall prepare and furnish background with ductwork at  $\frac{3}{8}'' = 1'-0''$  scale for all trades to indicate piping, cable tray and conduit in relation to all structural elements of the construction, including floor elevations; steel locations, size and elevations; partitions locations; door locations and direction of swing; and all other information required to assure coordination of the electrical, sheet metal and piping trades and fire protection in relation to the Architectural function of the project. Coordination meetings shall be held under the supervision of the Construction Manager (CM) or General Contractor (GC). Each trade shall have proper representation at all coordination meetings for the purpose of detailing, on the drawings mentioned above, the exact location and routing of their work. After the conclusion of the coordination at the working meetings, each trade shall sign the coordinated originals, copies of which shall be distributed by the CM or GC to all parties concerned including the Owner. Final shop drawings of all trades shall be in accordance with the coordinated drawing, after which final shop drawings shall be submitted for final approval.
- B. If the trade contractor installs work so as to cause interference with work of other trades, he shall make necessary changes in work to correct the condition immediately without delaying project and without extra charge.
- C. Dimensional layout plans of equipment rooms shall be made showing all bases, pads and inertia blocks required for mechanical equipment. Include dimensions of bases, bolt layouts, details, etc.
- D. Contractor shall furnish all necessary templates, patterns, etc., for installing work and for purpose of making adjoining work conform, furnish setting plans and shop details to other trades as required.

#### 1.17 EXCAVATION AND BACKFILLING

- A. Excavation and backfilling of trenches required for the installation of all services underground piping and underground tanks inside and outside of the building are to be provided by each respective Section involved.
- B. Trenching: Excavate to required depth and grade, the bottom of trenches to secure required slope for pipe lines. Each trade will be responsible for the required slopes, inverts, bed material, and all other pertinent requirements.
- C. Bottom of trench shall be accurately excavated to provide firm, uniform bearing for bottom of the pipe. Pipe having bells, sleeves or other enlargement at joints to have recesses excavated to accommodate these joints.

- D. Backfilling: Trenches shall not be backfilled until piping has been tested. Backfill consisting of sand or selected excavated material shall be placed to a level equal to the final grade and hand compacted as required to produce the same density as the soil in the surrounding areas. Furnish and run constantly, if required or directed, sufficient pumping machinery to keep trenches free from water up to the time of inspection and acceptance of that part of this work.
- E. Refer to General Conditions for additional requirements governing excavation and backfilling. These requirements shall prevail unless superseded by specific requirements in Division 23.
- F. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be approved before work commences. Each Trade Contractor shall provide all necessary sleeves, caulking and flashing required to make openings absolutely watertight.
- G. Provide sheet piling where required to properly support sides of trenches and excavations.

#### 1.18 CONCRETE AND GROUTING

- A. Requirements for concrete and grouting are specified in other Sections.
  - 1. Concrete shall be 3,000 psi stone concrete with water reducing admixture, except where otherwise specified.
  - 2. Concrete shall have air entraining admixture where exposed to weather.
- B. Contractor shall make coordinated layouts showing concrete work required for housekeeping pads, roof curbs, thrust blocks, etc. which are cast in place.
- C. Concrete housekeeping pads: 4" minimum thickness, sized to cover the full area of each piece of equipment and access area provided under Concrete Work.
- D. Concrete bases: Dimension and height to suit the equipment.
- E. Concrete inertia blocks for vibration isolation. Dimensions designed by the vibration isolation equipment manufacturer and inertia block provided by Division 23, under Mechanical work.
- F. Outside the building all concrete work related to mechanical equipment shall be provided by the Trade Contractor of Division 23, unless otherwise noted in the Contract Documents.

#### 1.19 ACOUSTICAL PERFORMANCE OF EQUIPMENT AND SYSTEMS

- A. Noise levels from operation of motor driven equipment, whether airborne or structure-borne, and noise levels created by or within air handling equipment and air distribution and control media, are not to exceed sound pressure levels determined by the noise criteria curves in the ASHRAE Guide and as noted under Section 23 0548.
- B. Acoustical Tests:
  - 1. Owner may require contractor to conduct sound tests for those areas or equipment he deems too noisy.



2. If NC level in any space exceeds that in the schedule or the specification due to improper installation or operation of mechanical systems, the respective Trade Contractor is required to make remedial changes or repairs.
3. Respective Trade Contractor is required to retest until specified criteria has been met.

## 1.20 OPERATING AND MAINTENANCE INSTRUCTIONS

### A. Instructions and Demonstration for Owner's Personnel:

1. After all equipment is functioning properly, each system is to be automatically operated for ten (10) working shifts, and not to be adjusted during this period, 80 hours in heating and 80 hours in cooling seasons, and 80 hours during "shoulder" or "swing" seasons scheduled at the convenience of the Owner. Any adjustments will void the test and start the time period all over again.
2. The hours of operation are to include the Owner's designated personnel in each shift, for each season.
3. During this period, instruct the Owner's personnel in the use, operation and maintenance of all equipment of each system. Training will include a lecture-type instruction given in a non-machine room environment. During the lesson, normal operation of the system installed and operating will be explained, along with troubleshooting procedures. This will be followed by a field inspection and demonstration of equipment.
4. The above instruction is exclusive of that required of specified equipment manufacturers. If more stringent or longer instruction is indicated for specific equipment or systems, these shall supersede the above requirements.

### B. Operating and Maintenance Data:

1. Provide four (4) complete sets of manufacturer's catalogues, instructions, maintenance and repair information and parts lists for operating equipment and devices. Include one (1) CD with a PDF file with all required documentation.
  - a. Include performance curves for fans and pumps, factory furnished wiring diagrams and control diagrams, and applicable flow diagrams.
  - b. Submit seven sets of instructions for distribution.
2. Data for the equipment actually installed is to be submitted.
3. The data is to be carefully checked for accuracy by comparison with the installed equipment nameplates.
4. Provide a recommended list of spare parts for equipment and list of special, non-standard tools to service equipment.
5. Index and assemble the instructions in durable loose-leaf binders.
6. The completed binders are to be available at the time the equipment installation begins.
7. In addition, follow all requirements of Section 01 7000 "Execution and Closeout Requirement".

## 1.21 RECORD DRAWINGS

- A. Provide and maintain a currently up-to-date record set of reproducible prints showing all changes, additions or omissions made during construction. Contractor shall, at his own expense, produce the Record Drawings.

- B. Deliver four (4) sets of all as-built drawings and one (1) set of reproducibles of the record drawings to the Owner before submitting requisition for final payment.
- C. Shop Drawings shall be cross-referenced on the mylar copies for this requirement where applicable.
- D. CADD background, if desired to be obtained from Engineer, sign release and indemnification and pay fee.
- E. Submit AutoCADD, or other as required by Owner, compatible as-built drawing files.

## 1.22 WARRANTY

- A. The following supplements the GENERAL CONDITIONS for Mechanical Work:
  - 1. Non-durable, expendable items such as replaceable (not cleanable) air filter media are not subject to replacement after the date of acceptance.
  - 2. Warranty time limits for equipment exceeding those indicated in GENERAL CONDITIONS are specified in the applicable Sections of Division 23.
  - 3. In addition, follow all requirements of Section 01 7000 "Execution and Closeout Requirement".

## PART 2 - PRODUCTS

### 2.1 IDENTIFICATION MARKINGS

- A. Every equipment valve, damper, control, and apparatus installed under this Contract shall be tagged, labeled or stenciled as follows: Tags and labels securely fastened by brass chains, screws or mastic as applicable. Equipment controls numbered according to equipment schedules on Plans. Tags numbered to conform to a directory listing number, location and use. Directories to be mounted under glass in aluminum self-closing frames, 8-1/2" x 11" in size.
  - 1. Apply identification after testing, insulation and field painting are completed.
- B. Valve Identification:
  - 1. Provide an identification tag for each valve, including control valves.
  - 2. Differentiate between the different classes of service in the numbering systems; as an example: "CHW-II", "HW-II" or "CW-II".
  - 3. Use 2" brass tags stamped with designation numbers 1" high, filled in with black enamel.
  - 4. Attach tags securely to handles or spindles of valves with heavy brass "S" hooks or brass chains.
  - 5. Provide six copies of valve charts with one of each framed under glass and mounted where directed.
- C. Piping Identification:
  - 1. Provide on bare and covered pipes for all services.
  - 2. Use a system of marking and colors conforming to ANSI A-13.1.

3. Install to provide permanent adhesion.
4. Install in readily visible location.
5. Apply legend and flow markers as required for maintenance purposes, with at least one marker in every 50'-0" of each line and at every change of direction.
6. Color Coding of Piping: After piping has been finish painted, the installer of the piping shall identify the type of service lines with applied color bands and stenciled letters. The direction of flow shall be indicated with stenciled arrows. Color bands shall be 1-inch wide, finished in gloss enamel; lettering and arrows shall be same color as the bands. Specify that indicators be applied at connections to pumps, chillers, and other equipment; at entrances to spaces; adjacent to valves; near access doors to pipe spaces; and at maximum intervals of 50 feet on long pipe runs and at each change of direction. Specify that letters be positioned to be easily read from a normal standing position. If there is no owner's standard for color code and designation, the following colors and letter designations shall be used:

**HVAC PIPING**

<u>Service</u>	<u>Color</u>	<u>Designation</u>
Pumped Condensate	Yellow	PR
Chilled Water Supply	Blue	CHWS
Chilled Water Return	White with 2 blue vertical stripes 15'-0" o.c.	CHWR
Sec Chilled Water Supply	Magenta	CHWS
Sec Chilled Water Return	Magenta	CHWR
Condenser Water Supply	Green	CWS
Condenser Water Return	Green	CWR
Hot Water Supply	Brown with Red Bands	HWS
Hot Water Return	Brown with Orange Bands	HWR
Compressed Air (Controls)	Green	CCA
Fuel Oil Supply No. 2	Yellow with 2 black vertical stripes 15'-0" o.c.	FOS
Fuel Oil Return No. 2	Yellow with 2 black vertical stripes 15'-0" o.c.	FOR
Steam	Orange	HPS, LPS
Other	As directed	As directed

**D. Equipment Identification:**

1. Provide stencil lettering on operating equipment and units:
  - a. Use black oil base paint, except where equipment finish is dark, use white paint.
  - b. Make all characters distinguishable from the floor, but not less than 2" high.
2. For each motor starter, controller and similar accessory provide a lamcore nameplate attached with screws or rivets to a fixed part of the equipment in a visible location.
  - a. Make plates not less than 2" x 1" x 1/8" thick with 1/4" high characters.
  - b. Designations for equipment tags shall match contract schedules.

3. Equipment such as fans, tanks, ducts, access doors to equipment such as filters, coils, fans, neatly stenciled with letters not less than 1 inch high. Any equipment too small to receive such stenciling shall be provided with brass name tags 2" x 1" in size.
    - a. Label ducts by function (supply air, return air, exhaust air and transfer).
  4. In areas where removable ceilings occur, install appropriate color coded tile markers to indicate location of valves and other equipment or fittings that may require maintenance service.
- E. Refer to Section 23 0553 for additional requirements

## 2.2 PROTECTION OF ELECTRICAL EQUIPMENT

- A. Keep piping 2'-0" outside the vertical line of unprotected electrical equipment or provide non-corrosive metal (soldered 20 gauge copper or welded stainless steel), watertight support, pans piped to an open drain.
1. Construct and support pans to hold minimum depth of 3 inches of water.

## 2.3 ACCESS DOORS

- A. General:
1. Steel, flush four-sided frame and door assembly, chemically cleaned after fabrication and painted with rust inhibitive primer.
  2. Provide hardware and locking devices.
  3. Provide access doors required for access to mechanical work through finished wall construction and non-removable ceiling construction.
  4. Deliver doors and location information to appropriate trade for installation.
- B. Furnish for installation by the appropriate trade, flush type access door or panel no smaller than 18" x 18" and no larger than 30" x 30" for all dampers, valves, cleanouts, or apparatus located in chases, walls, non-accessible hung ceilings or floors; finish shall be prime coat, except floor panels which shall be polished brass or chrome plate. Doors and trim 14 gauge steel, frame 16 gauge steel, with flush concealed and standard flush locks, screwdriver operated cams, of Milcor manufacturer or approved equal.
1. All panels and their exact location subject to approval of the Architect.
  2. Where space conditions prevent door swinging open, provide removable door on lift-up hinges. This will only be accepted on a case-by-case basis. This condition must be submitted to the Owner and Engineer for approval prior to installation.
  3. Furnish a complete list locating all access doors required in finished walls, ceilings, partitions, shafts and other inaccessible locations.

## 2.4 PRIME PAINTING

- A. All piping, supports, auxiliary steel and miscellaneous iron within all MER's shall be prime painted as specified herein.

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- B. All exposed uninsulated piping, fittings, equipment stands, supports, platforms, cradles, and hangers; except chrome finished materials, shall be painted. All ungalvanized surfaces shall be painted with zinc chromate, or approved equal, and all galvanized surfaces shall be prime coated with a phosphate pretreatment coating, dry film thickness of 0.35 with a 0.50 mil. one coat Glid-Guard galvanized steel primer Y5229, or approved equal.
- C. Upon completion of the prime coat of all mechanical equipment specified above, all insulated and exposed piping shall be painted with finish coating, as specified under Division 09900 and/or other Sections. This Section shall complete stenciling and color identification, specified under Division 23, following the finish painting.
- D. Except where otherwise specified, steel piping in concrete and buried steel piping and steel tanks:
  - 1. Provide factory-applied anti-corrosive polyurethane coating, minimum 15 mils thickness which complies with UL 1746, Parts I and IV.
  - 2. In accordance with NFPA and other applicable codes.
- E. Provide factory finishes, except as noted, to match Architect's color samples, for items appearing in exposed finished work, and including:
  - 1. Equipment
  - 2. Registers and grilles
  - 3. Diffusers
  - 4. Enclosures on equipment
  - 5. Thermostat Covers
- F. All damaged factory painted surfaces shall be repaired to match original surface. If, in opinion of Owner, such repairs are unsatisfactory, item in question shall be completely refinished or replaced with new.

## 2.5 WELDING

- A. General:
  - 1. All welding procedures, welders, and welding operators shall be qualified in accordance with the requirements of ASME/ANSI B31.9 and Section IX of the ASME Code, latest editions.
  - 2. Welding procedures shall be reported on ASME Section IX Forms "QW," or its equivalent. Joint preparation sketches (to be included with the welding procedures) shall show all dimensions including tolerances, for bevel angle, land size, offset and root gap.
  - 3. Contractor shall be responsible for the welding performed by personnel of his organization and shall conduct the required qualification tests and submit results to the Owner for his review and approval.
- B. Processes:
  - 1. Employ the Manual Shielded Metal-Arc (SMAW) welding process.
  - 2. Double butt welding shall be permitted on all joints accessible from both sides. Where double butt-welding is employed, the first root pass shall be back-chipped.

3. Welding of pressure parts shall be performed with low hydrogen type electrodes. Electrodes of Classifications E6012, E6013, E7014 and E7024 shall not be used.
  4. Brazing and Soldering:
    - a. The Contractor shall prepare applicable "Brazing and Soldering Procedures" forms for approval of the Owner.
    - b. Brazing shall conform to ASME Section IX.
    - c. Soldering shall conform to the relevant procedures in the manuals of the Copper Development Association.
    - d. For all refrigeration piping, the mechanics shall be skilled and specially trained in this type of pipe joining.
    - e. The Owner may reject any brazed or soldered joint for lack of penetration or for other applicable grounds. These defective joints shall be redone until satisfactory.
- C. Quality of Workmanship - In addition to conformance with the procedural and quality requirements set forth in the applicable Code or material specification, all welding shall meet the following requirements.
1. Butt welds shall have full penetrations and shall be slightly convex with uniform height.
  2. Each weld shall be uniform in width and size throughout its full length.
  3. Each layer of welding shall be smooth, free of slag, cracks, pinholes, undercut in excess of 1/32" and completely fused to adjacent weld beads and base metal.
  4. Cover passes shall be free of coarse ripples, irregular surface, non-uniform bead patterns, high crown, and deep ridges or valleys between heads. The surface smoothness of the finished weld shall be suitable for the proper interpretation of non-destructive examination of the weld.
  5. Surfaces of parts to be joined by welding shall be cleaned of all oil, grease, paint, scale and rust with solvent and/or wire brushing.
  6. Fillet weld size shall be in accordance with the applicable code or as specified on the drawings with full throat and legs of equal length.
  7. Welding filler metal and welding flux shall be properly stored in such a manner as to ensure that no damage to the coating or corrosion of weld rod will occur. Low hydrogen type electrodes shall be stored in enclosures which provide a regulated temperature as prescribed by the electrode manufacturer. All electrodes shall be properly identified.
  8. Socket welds shall have a gap of approximately 1/16" between the bottom of the socket and the end of the pipe prior to welding. Socket welds shall have a minimum of two weld layers.
  9. Welds for steam piping shall be X-rayed in accordance with NCBC requirements. Submit results of X-ray analysis for approval.
- D. Repair and Weld Defects:
1. A weld is defective and shall be repaired if it does not meet the acceptance standard of each applicable non-destructive examination as defined ASME/ANSI B31.9, latest edition.
  2. Repairs shall be made in accordance with ASME/ANSI B31.9, latest edition.
- E. Welding Identification and Weld Marking:
1. All welds must be identified with the welder's identifying symbol. Welds, where more than one welder performs the work, shall be stamped by each welder.
  2. Marking shall be done by a permanent method that will not result in sharp discontinuities.

3. Where stamping or marking on the base materials is not practical or feasible, permanently affixed metal bands of the same material may be applied. Stamping or any method of permanent marking on the bands is acceptable.

## 2.6 EQUIPMENT AND SYSTEMS CRITERIA

- A. The criteria of design and performance to produce the required operation is based on equipment shown or scheduled, and as specified.
- B. Equipment of other manufacturers will be considered, subject to its acceptability and the following:
  1. The equipment must conform to the structural design provisions for loads applied to the structure; to the dimensions established by drawings for spaces and other (service, etc.) clearances; and for inlet and outlet locations and relationships to associated equipment, piping and ducts.
  2. Changes to the building arrangement or structure, which are required to suit equipment offered must be by the Contractor at no extra expense to the Owner.
  3. Changes to the electrical requirements such as circuit breaker or starter size, conduit or wire size shall be coordinated by the Contractor and the expense borne by him with no additional cost to the Owner.
  4. Changes to other Contractor's scope of work shall be the responsibility of this Contractor, at no extra expense to the Owner.
- C. Operating equipment, operating systems and other products are specified by names and models and also by performance criteria standards:
  1. Where both specifying media are employed, the names and models establish a standard for manufacturing quality, while the performance criteria governs the capacity, rating or output.
  2. In any question regarding intent, the capacity, rating or output which is compatible with the other systems, is intended to be of prime concern and is to be provided.
  3. Contractor shall follow Owner's Standards for Turn-Over Acceptance, Commissioning and Testing. Where there is a conflict between these requirements and Building Department's requirements, the more stringent requirements shall apply.
- D. The descriptions of equipment and systems cover basic equipment and operation, but not all the details of design and construction.
  1. The use of singular in descriptions does not limit the quantities to be furnished to produce the complete system, together with the results specified.
  2. Furnish equipment required to provide specified performance under installed conditions.
  3. Factory wiring and piping is to conform to specifications for field work, unless otherwise specified.
  4. Provide trim, enclosures, transition pieces and accessories required to make complete installation in each instance.
  5. Provide all seismic provisions as required to meet NCBC requirements.
- E. All Mechanical Drawings of Division 23 are schematic and diagrammatic.
  1. Symbols and diagrams are used to indicate the various items of work and the complete systems, but they do not necessarily have dimensional significance, neither do they

- necessarily include all related and subsidiary parts and equipment. Contractor shall provide all parts, elements, transition pieces, etc. as required for a complete and operational system.
2. The work is to be installed complete and ready for operation in conformity with the intent expressed on the Drawings and in the Specifications.
  3. Coordinate work with the requirements of the Architectural and Structural drawings for dimensions, locations and clearances.
  4. Locations of mechanical and electrical items which are exposed to view shall be taken from the Architectural Drawings where available, or are to be located as directed by the Architect.
  5. Contractor shall provide all transition pieces and rises/drops for piping and ductwork.
  6. Minimum height of piping, ductwork, valves, etc. in mechanical rooms excluding drops to equipment, shall be 7'-0" unless otherwise noted.

## 2.7 EQUIPMENT INSTALLATION

- A. Locate and set equipment anchor bolts, dowels and aligning devices for equipment requiring them.
  1. Level and shim the equipment; coordinate and oversee the grouting work.
  2. After one week of continuous operation, the technician will return to check and realign all shafts, bearings, seals, couplings and belt drives as needed. Provide report indicating completion of this work.
- B. Field assembly, installation and alignment of equipment is to be done under field supervision provided by the manufacturer or with inspection, adjustments and approval by the manufacturer, as a part of the Contract.
- C. Alignment and Lubrication Certification for Motor Driven Apparatus:
  1. After permanent installation has been made and connections have been completed, but before the equipment is continuously operated, a qualified representative of the manufacturer is to inspect the installation and shall report in writing on the manufacturer's letterhead as follows:
    - a. That shafts, bearings, seals, couplings, and belt drives are perfectly aligned and doweled so the equipment will remain perfectly aligned in the normal service intended by the Documents and that no strain or distortion will occur in normal service. All dowels shall be aligned after equipment is running.
    - b. That all parts of the apparatus are properly lubricated for operation.
    - c. That the installation is in accordance with manufacturer's instructions.
    - d. That suitable maintenance and operating instructions have been provided for the Owner's use.
- D. Belt Drives:
  1. V-belt drives shall include a driving and driven sheave grooved for belts of trapezoidal cross-section. Belts shall be constructed of fabric and rubber so designed as not to touch the bottom of the grooves, the power being transmitted by the contact between the belts and V-shape groove sides. Drives shall be designed for a minimum of 150 percent of motor horsepower. Drive sheaves shall be of the companion type.



2. All motors shall be provided with fixed sheaves, once the correct speed is determined during testing/balancing period.
3. All fans shall be installed with fixed pitch sheaves on their drive motors. Sheaves shall be selected to provide air quantities under specified conditions. Air systems shall be put into operation, and Contractor shall determine actual size of sheaves required to produce specified air quantities on installed systems via the use of adjustable sheaves. Adjustable pitch sheaves shall then be replaced with the proper size fixed sheave. Adjustable pitch sheaves shall be property of Contractor and removed from premises.

E. Machinery Guards:

1. Motor drives shall be protected by belt guards furnished by the equipment manufacturer or in accordance with the Sheet Metal and Air Conditioning Contractors National Association's Duct Manual. In all cases, guards of all types must be as approved as acceptable under OSHA Standards.

F. Equipment Startup:

1. Each equipment manufacturer is to provide qualified personnel to inspect and approve equipment and installation and to supervise the startup of the equipment and to supervise the operating tests of the equipment.
2. If a minimum number of hours for startup and instruction are not stated with the equipment specifications, these shall be 2 full 8-hour working days as a minimum.
3. Advise Owner of startup at least 72 hours in advance.

G. Equipment Turn-Over:

1. Contractor shall follow Owner's Standards for Turn-Over Acceptance, Commissioning and Testing. Where there is a conflict between these requirements and the regulations by commissioning agent, the more stringent requirements shall apply.

## 2.8 CLEANING AND ADJUSTING

A. Notification:

1. Inform owner and architect's field representatives of all cleaning, blowing out and fill-up schedules one week prior to starting.
2. Notify owner and architect again, 48-hours prior to each event. If neither attends the procedures, notify in writing, the specific task performed 24-hours after each event.
3. Leaks appearing during the various pressure tests shall be corrected by replacing all defective materials or welds and subsequent tests shall not be made until the piping is found in perfect condition. Caulking of screwed joints or peening of welds is prohibited. Wherever it is necessary to cut out a weld and the ends of the pipe cannot be conveniently brought together, then a short piece shall be fitted in and welded.
4. Damage to the building and equipment resulting from tests shall be repaired at no additional cost to the Owner.
5. Tests claimed to have been performed without following above procedures shall be deemed as not performed.

B. Cleaning:

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1. Blow out, clean and flush each piping system and equipment, to clean thoroughly. MSDS forms for clean agent and procedure shall be presented to the field office. After cleaning, the systems shall be tested by an independent organization, approved by Owner's representative prior to testing.
2. Clean all materials and equipment; leave in condition ready to operate and ready to receive succeeding finishes where required.
3. Clean the operating equipment and systems to be dust free inside and out.
4. Clean concealed and unoccupied areas such as plenums, pipe and duct spaces and equipment rooms to be free of rubbish and dust.
5. After completion of all pressure tests, properly clean every piece of apparatus furnished and remove caps and other provisions made for testing purposes only.
6. Cutting oil, excess pipe joint compound, finely divided solids and other similar foreign material shall be removed from all circulating water systems before they go into operation. Before chemical cleaning of water systems flush with clean water. Each system shall be cleaned chemically with circulating solution as specified in section 23 2500. Fill, vent and circulate the system with this solution at maximum operating temperature for required duration. During cleaning procedure, circulation shall be stopped periodically followed by blow off at all low points. Immediately following chemical cleaning, system to be drained and then refilled with clean water to which treatment shall then be added. After systems have been drained, flushed and refilled, a chemical test shall be made to determine that the cleaning solution remaining in the system does not impart alkalinity to the water in excess of 300 ppm.
7. After the water piping system has been properly cleaned as indicated above, each water system shall be operated for a minimum of 3 days with 1/2" surgical felt, bonded to baskets on each pump strainer. Felt filters shall be run for as long a time as necessary to thoroughly clean all piping until approved by Owner's representative. During the cleaning period, heat exchangers and coil valves shall be kept closed for the entire cleaning period. Provide one (1) inch manual bypass at equipment to permit flushing of branch piping. For flushing and blow-off for main risers, provide drain valves at the bottom in the horizontal runout to the riser. Also provide an additional valve in the cyclo-clean separator piping for pumps with mechanical seals so that separator discharge water may be wasted during the cleaning procedure.
8. All pipe strainers shall be removed and cleaned upon completion of blowdown period.
9. After this period of operation, all systems shall be drained and refilled with fresh water and new chemicals as specified.
10. All equipment installed shall be thoroughly cleaned in preparation of the finished painting.
11. All dowels shall be aligned after system is running.

C. Adjusting:

1. Adjust and align equipment interconnected with couplings or belts. After one week of continuous operation, the technician will return to check and realign all shafts, bearings, seals, couplings and belt drives as needed. Provide report indicating completion of this work.
2. Adjust valves of all types and calibrate equipment of all types to provide proper operation.
3. Clean all strainers after system cleaning and flushing and again before final system startup.
4. Motors, fans, pumps, compressors, etc. shall be properly oiled and left ready for operation.
5. Verify that each and every supply and return and exhaust fan, each fan coil unit fan, motor and automatic control valve is in running condition. All equipment shall be cleaned, including coils, motors, housing, pans, etc. and inspected by the Owner's representative.

6. Submission of certified tests shall, in no way, relieve the Contractor of fulfillment of guarantee.
7. Gauges, instruments, thermometers and meters shall be checked and tested to specified accuracy.
8. Alarms shall be tested to fulfill satisfactory operating conditions.
9. Allow sufficient time to perform all tests, adjustments, etc., necessary to place the various systems in final operating condition, verify performance requirements and check all safety devices. Labor, instruments, etc., required for various tests shall be furnished by Contractor. The Contractor shall see that all his Sub-Contractors, manufacturer's representatives or Field Engineers necessary to check and adjust various systems are present, with sufficient forms, and that all test results are recorded properly and turned over to Owner for approval.
10. The Owner's representative will make final check for all systems only after Contractor has completed and returned to the Owner all recorded test data together with letter that his work is 100% complete. Additional tests may be required to meet the requirements of Owner's documents for demonstration of various systems, whether or not specified, to verify performance, workmanship or for adjustments.
11. Unless otherwise specified, equipment shall be installed and adjusted in accordance with manufacturer's recommendations to function properly with capacities required or specified.
12. Provide adjustments during summer, winter and shoulder/swing seasons.

D. Running Test of Piping Systems:

1. Any section of the work, after it has been completed and otherwise satisfactorily tested, shall be put in actual operation by Contractor and operated by him for a period of 2 days of 24 hours each, during which time any defects which may appear shall be remedied and any necessary adjustments shall be made. Test shall be performed in the presence of the Owner or his representative, and serve as part of the Instructions Program.
2. During the time of the tests, repack all valves, make all adjustments and otherwise put the apparatus in perfect condition for operation, and shall instruct the Owner's authorized personnel in the use of management of the apparatus. All joints shall be made absolutely tight under tests. Caulking of pipe joints or makeshift methods of repairing leaks shall not be allowed. Piping which is not tight under tests shall be taken down and reassembled.
3. All gauges, thermometers, alarms, instruments, etc. shall be tested to demonstrate that they are functioning properly and within the range of these devices, and to show their degree of accuracy.
4. If during the first test run, the system cannot be completely vented within 24 hours, install additional air vents at high points of system to facilitate quick venting of all water systems.

E. Permanent Equipment Operating During Construction:

1. Use only in same service as the permanent applications, provided that written approval is granted by Owner's representative.
2. Use disposable filters during temporary operation.
3. Expendable media, including belts used for temporary operation and similar materials are to be replaced just prior to acceptance.
4. Packings in equipment operated during construction must be repacked just prior to system acceptance, using materials and methods specified by the supplying manufacturer.

- F. Retouch or repaint equipment furnished with factory finish as required to provide same appearance as new.
- G. Tools:
  - 1. Provide one set of specialized or non-standard maintenance tools and devices required for servicing the installed equipment.
- H. Fan and Pump Characteristic Charts:
  - 1. Fan Characteristic Charts: Furnish 4 characteristics curve charts for each fan, including those embodied in factory assembled units. Characteristic curve charts shall not be less than 8-1/2" x 11" and shall show the static pressure, capacity, horsepower and overall efficiency for operating conditions from no load to 130% specified load.
  - 2. Pump Characteristic Charts: Furnish 4 characteristic charts for each pump. Charts shall be not less than 8-1/2" x 11" showing head developed, efficiency and power required for varying capacities at the operating speed of the equipment.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Temporary Protection:
  - 1. Provide and maintain protection for the work whether completed or in progress.
  - 2. Provide suitable coverings and enclosures.
- B. Scaffolding, Rigging and Hoisting:
  - 1. Provide all scaffolding, rigging and hoisting services necessary for erection, and/or delivery into the premises, of any equipment and apparatus furnished. Remove from the premises when no longer required.
- C. Waterproofing:
  - 1. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Architect before work is done. This Contractor shall provide all necessary sleeves, caulking and flashing required to make openings absolutely watertight.

#### 3.2 EQUIPMENT BASES, PLATFORMS AND SUPPORTS

- A. Provide supporting platforms, steel supports, anchor bolts, inserts, etc., for all equipment and apparatus requiring access for service and maintenance.
- B. Obtain prior approval for installation method of structural steel required to frame into building structural members for the proper support of equipment, conduit, etc. Welding will be permitted only when approved by the Architect or the Structural Engineer.

- C. Submit shop drawings of supports for approval to the Architect before fabricating or constructing.
- D. Provide leveling channels, anchor bolts, complete with nuts and washers, for all apparatus and equipment secured to concrete pads and further supply exact information and dimensions for the location of these leveling channels, anchor bolts, inserts, concrete bases and pads.
- E. Where supports are on concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing.

### 3.3 ACCESSIBILITY

- A. The installation of valves, dampers and other items shall be conveniently and accessibly located with reference to the finished building floors, walls, roof and penthouses as applicable.
- B. In-line pumps shall not be installed higher than 7 ft. above floor and shall be fully accessible for servicing its motor, valves, controls and instruments.
- C. Equipment removal, tube-pull access door swing spaces shall be identified on shop drawings and maintained during installation.

### 3.4 MODIFICATIONS TO EXISTING WORK

- A. Contractor shall perform all work as shown or as specified, within the existing site and structures as part of this Contract without detriment to the existing systems or equipment to be kept in operation or maintained in their places.
- B. For full extent of modifications to be done to existing systems, Contractor shall inspect existing systems and site conditions to familiarize himself with the complexity of his work related to removals and relocations required, and the existing finishes to be preserved without any damage resulting from possible careless installation procedures. Upon written request by the bidders, Owner shall make the existing schematic plans available for inspection (at his own address) without any responsibility for their completeness or accuracy.
- C. As-Built drawings are not available on the existing installations. Any drawings that may be available to the Contractor are for information only. All field criteria must be field verified by Contractor.
- D. All cutting shall be done only by mechanics skilled in the particular trade which is affected. No cutting shall be done without proper protections against damage, dirt and dust resulting therefrom or without proper safeguards to workmen, the public, and occupants of buildings.
- E. Before cutting is started in any location, Contractor shall carefully investigate conditions influencing human and structural safety. Existing piping, wiring and items concealed in walls and slabs, wherever these walls and slabs are removed, shall be properly relocated, rerouted or removed as the case may require.
- F. General Construction trades shall perform all finish masonry, repairing, restoring and finishing of all cut openings, closing up of existing openings, and removing and restoring the affected sections of the suspended ceilings.

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- G. If, during partial occupancy of the building, circumstances necessitate temporary shutdown of any facilities or otherwise interfere with access to building, owner shall be given a minimum of 48 hours notice before doing such work.
- H. In all areas where interface, relocation or alternation work is to be done, Contractor shall disconnect and remove from the premises all existing ductwork, piping, etc., that will not be required to remain in service after the alterations are completed. All such equipment (except as requested as salvage by the Owner) shall become the property of this Contractor, and he shall remove same from the premises immediately upon disconnection. Existing ductwork, piping, etc., being removed shall not be reused.
- I. Contractor shall move or relocate any existing mechanical equipment, piping, ductwork, etc., which may temporarily interfere with the construction, (to a temporary location) if the existing equipment is to be kept in operation during construction. He shall also install temporary piping, ductwork or equipment that might be required (during demolition or excavation and during the construction of tunnels, retaining walls, footings or columns) for offsetting all piping around the construction area in order to maintain services to the existing systems. Provide temporary piers, supports and hangers as required for excavation.
- J. The trade in charge of concrete and superstructure shall provide all cuts and openings through structural slabs and walls, except for core drillings for passage of piping. Contractor shall coordinate his work with concrete contractor and provide necessary dimensions for all openings.
- K. Upon completion, remove all temporary piping and equipment, shoring, scaffolds, etc., and leave all areas clean and free from material and debris resulting from work performed under this Section. Provide rough patching in areas shown.
- L. Test all piping to be retained or shown to be re-used together with the new extensions connected to them. Install isolation valves as required.
- M. Where a fan or any of its connected ductwork is to be modified, relocated or ductwork extended to a new discharge location, test fan prior to starting work and submit test data to Architect for record purposes. Test same fan following completion of work to verify its final capacity in terms of CFM, Static Pressure and Amperes drawn while in operation, showing compliance to data previously established.

### 3.5 USE OF EQUIPMENT

- A. The use of any equipment, or any part thereof, for purposes other than testing even with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor shall it be construed to obligate the Owner in any way to accept improper work or defective materials.
- B. Use of permanent equipment for temporary services must be approved in writing by Owner.

### 3.6 CODES, RULES, PERMITS & FEES

- A. The Contractor shall give all necessary notices, obtain all permits and filings and pay all government sales taxes, fees, and other costs, in connection with his work. However, all utility

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connections, extensions, and tap fees for water, storm, sewer, gas, telephone, and electricity shall be paid directly to utility companies and/or agencies by the Owner, unless otherwise indicated. The Contractor shall file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver same to the Owner's Representative before request for acceptance and final payment for the work.

- B. The complete design and construction shall conform to the requirements of the NCBC, NCMC, NCFC, NCECC, NFPA, NEC, FM, UL and any other local or state code which may govern.
- C. Provide all permits for boilers, stacks, chillers, fuel oil equipment, fuel oil tanks, equipment, systems, etc. as required.

### 3.7 FINAL INSPECTION

- A. Contractor shall arrange and schedule final inspection of work and shall notify the Architect in writing that the Contractor has thoroughly checked his work and, in the opinion of the Contractor, is ready for final inspection.
- B. During the entire period schedule for these inspections, the Contractor and representatives of each manufacturer of equipment involved shall be present. All of these organizations shall have sufficient and competent personnel present so that adjustments can be made to all systems without delay.
- C. Contractor shall recheck equipment after seasonal use to ensure proper operation for summer, winter and shoulder/swing seasons.

### 3.8 ACCEPTANCE

- A. The operation or the temporary use of the equipment and the mechanical and electrical installation, by the Owner does not constitute an acceptance of the work. The final acceptance is to be made after the Contractor has adjusted his equipment, demonstrated that it fulfills the requirements of the Contract Documents, and has furnished all the required Certificates. Warranties and guaranties are effective after the final acceptance.

### 3.9 GUARANTEE

- A. Submit a single guarantee stating that all portions of the work are in accordance with Contract requirements. Guarantee all work against faulty and improper material and workmanship for a period of one year from date of final acceptance by the Owner, except that where guarantees or warranties for longer terms are specified herein, such longer term shall apply. At no additional cost to Owner, within 72 hours after notification, correct any deficiencies which occur during the guarantee period, all to the satisfaction of the Owner and Architect.
- B. Guarantee that the materials and workmanship supplied under this division will be of the best quality currently available, that the equipment will be erected in a practical manner and in accordance with best practices, that it will be complete in operation, nothing being omitted in the way of labor and material required to make this so, although not specifically shown or mentioned herein and that it will be delivered in proper working order, complete and perfect in

every respect without additional cost – whether or not shown in detail on the drawings or described in detail in this specification.

- C. Be responsible for all damage to or caused by the work performed under this division for a period of one year from date of acceptance of work under this Contract. Repair at no cost to Owner all such damage which occurs within 24 hours' notice thereof by the Owner. Damage which occurs prior to the completion of this work shall be repaired at once. Be responsible for any damage and repair thereof and reimburse Owner of all expense incurred thereby. Indemnify and defend the Owner, the Architect, the Construction Manager and the Engineer against loss, liability, damage or expense, including reasonable attorneys' fees, in connection with any claim resulting from such deficiencies which may be asserted by any third party, including Tenants.

**END OF SECTION 23 0500**



## **SECTION 23 0513 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes single- and three-phase motors for application on equipment provided under other sections and for motors furnished loose to Project.
- B. Related Sections:
  - 1. Section 26 0526 - Grounding and Bonding for Electrical Systems.
  - 2. Section 26 0553 - Identification for Electrical Systems.

#### **1.2 REFERENCES**

- A. American Bearing Manufacturers Association:
  - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. National Electrical Manufacturers Association:
  - 1. NEMA MG 1 - Motors and Generators.
- C. International Electrical Testing Association:
  - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- D. North Carolina Electrical Code
- E. Underwriter's Laboratory

#### **1.3 SUBMITTALS**

- A. Section 01 3300 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit catalog data for each motor furnished. Indicate nameplate data, standard compliance, electrical ratings and characteristics, and physical dimensions, weights, mechanical performance data, and support points.
- C. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.
- D. The motor nameplate and connection diagram shall be stainless steel and contain the following information:

1. Manufacturers' name
2. Rated volts and full load current
3. Rated frequency and number of phases
4. Rated full load speed
5. Rated temperature rise and rated ambient temperature
6. Time rating
7. Rated horsepower
8. Locked rotor code letter
9. Motors starting on wye connection and running on delta, shall be marked with the code letter corresponding to the wye connection.
10. Dual voltage motors which have a different locked rotor KVA on the two voltages, shall be marked with the code letter for the voltage giving the highest locked rotor KVA.
11. NEMA design letter
12. Service factor
13. Efficiency

- E. In general, motors shall be furnished integrally mounted on all items of mechanical equipment.

#### 1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. All motors shall be UL approved and listed.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 - Product Requirements: Product storage and handling requirements.
- B. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.
- C. Protect products from weather and moisture by covering with plastic or canvas and by maintaining heating within enclosure.
- D. For extended outdoor storage, remove motors from equipment and store separately.

### PART 2 - PRODUCTS

#### 2.1 REQUIREMENTS FOR MOTORS

- A. Manufacturers: Subject to compliance with the requirements, manufacturers offering products that may be suitable for use on this project include, but are not limited to, the following or approved equal:
1. Cooper Industries Inc.
  2. Baldor Electric Co.
  3. General Electric Co.

4. Emerson Electrical
  5. Substitutions: Section 01 6000 - Product Requirements.
- B. Motors 1/2 hp and Larger: Three-phase motor as specified below.
- C. Motors Smaller Than 1/2 hp: Single-phase motor as specified below, except motors less than 250 watts or 1/4 hp may be equipment manufacturer's standard.
- D. Three-Phase Motors: NEMA MG 1, Design B, premium-efficient squirrel-cage induction motor, with windings to accomplish starting methods and number of speeds as indicated on Drawings.
1. Voltage: As indicated on Drawings.
  2. Service Factor: 1.15 unless indicated otherwise on Drawings.
  3. Enclosure: Meet conditions of installation unless specific enclosure is indicated on Drawings or specified. Enclosure for pump motors or motors exposed to weather shall be totally enclosed fan-cooled type.
  4. Design for continuous operation in 40 degrees C environment, with temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
  5. Insulation System: NEMA Class F.
  6. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
  7. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay with wiring to terminal box.
  8. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA 9, L-10 life of 200,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
  9. Sound Power Levels: Conform to NEMA MG 1.
  10. Efficiency: Premium efficiency motors conforming to NEMA. Motor efficiencies shall meet the requirements for financial rebates from NYSERDA.
  11. Inverter Duty Rated for motors controlled by VFD. Fan motors controlled by VFD shall be equipped with shaft grounding rings.
  12. Motor weight exceeding 25 pounds shall have lifting eyes.
  13. Motor efficiencies shall meet minimum requirement for local utility company rebates.
- E. Single Phase Motors:
1. Permanent split-capacitor type where available, otherwise use split-phase start/capacitor run or capacitor start/capacitor run motor.
  2. Voltage: 115 volts, single phase, 60 Hz.
- F. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

## 2.2 SOURCE QUALITY CONTROL

- A. Test motors in accordance with NEMA MG 1, including winding resistance, no-load speed and current, locked rotor current, insulation high-potential test, and mechanical alignment tests.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install motor in alignment with shaft of the drive. Alignment test must be done prior to operating the equipment.
- B. Install engraved plastic nameplates in accordance with Section 26 0553.
- C. Ground and bond motors in accordance with Section 26 0526.
- D. Coordinate two-speed motor installation with Division 26.
- E. Provide motor shaft grounding ring (SGR) for motors controlled by Variable Frequency Drive.

#### **3.2 FIELD QUALITY CONTROL**

- A. Section 01 4000 - Quality Requirements and 01 7000 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.15.

### **END OF SECTION 23 0513**

## **SECTION 23 0514 – MOTOR CONTROLS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. All work shall be subject to the General Conditions and shall comply with applicable requirements of the contract.
- B. Requirements of Section 23 0500 shall also govern work specified herein, together with all applicable paragraphs of other Mechanical sections.

#### **1.2 REFERENCE STANDARDS**

- A. National Electrical Manufacturers Association:
  - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
  - 2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
  - 3. NEMA ICS 2.3 - Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers.
  - 4. NEMA ICS 3 - Industrial Control and Systems: Factory Built Assemblies.
  - 5. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
  - 6. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives.
  - 7. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems.
  - 8. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- B. International Electrical Testing Association:
  - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. Underwriters Laboratories Inc.:
  - 1. UL 198E - Class R Fuses.
  - 2. UL 489 – Molded-Case Circuit Breaker, Molded-Case Switches, and Circuit-Breaker Enclosures.
  - 3. UL 508 - Industrial Control Panels.
  - 4. UL 845 - Motor Control Centers.
- D. Material and Installation shall comply with latest editions of NCBC Code.
- E. Examine the Contract Documents of Division 26 for coordinating work specified under this section.

### 1.3 SUBMITTALS

- A. Submit shop drawings and product data in accordance with general conditions.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Furnish and install all motors, and furnish all variable speed drives, combination motor starters/disconnect switches, disconnect switches and starters that are required for controlling the HVAC equipment and motors.
- B. Coordinate with Division 26 work for installation of and for proper integration of electrical power wiring with the motors, and equipment that are provided under Division 23.

### 2.2 VARIABLE FREQUENCY DRIVES

#### A. Description

- 1. This specification is to cover a complete Variable Frequency motor Drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use with a standard NEMA Design B induction motor.
- 2. The drive manufacturer shall supply the drive and all necessary options as herein specified. The manufacturer shall have been engaged in the production of this type of equipment for a minimum of twenty years. VFD's that are manufactured by a third party and "brand labeled" shall not be acceptable. All VFDs installed on this project shall be from the same manufacturer.

#### B. Quality Assurance

- 1. Referenced Standards:
  - a. Institute of Electrical and Electronic Engineers (IEEE)
    - 1) Standard 519-1992, IEEE Guide for Harmonic Content and Control.
  - b. Underwriters Laboratories
    - 1) UL508C
  - c. National Electrical Manufacturer's Association (NEMA)
    - 1) ICS 7.0, AC Adjustable Speed Drives
  - d. IEC 16800 Parts 1 and 2
  - e. National Electric Code (NEC)
    - 1) NEC 430.120, Adjustable-Speed Drive Systems

- f. International Building Code (IBC)
  - 1) IBC 2006 Seismic – referencing ASC 7-05 and ICC AC-156
- 2. Qualifications:
  - a. VFDs and options shall be UL listed as a complete assembly. VFD's that require the customer to supply external fuses for the VFD to be UL listed are not acceptable. VFDs with red label UL stickers, requiring additional branch circuit protection are not acceptable. The base VFD shall be UL listed for 100 KAIC without the need for input fuses.
  - b. CE Mark – The VFD shall conform to the European Union Electromagnetic Compatibility directive, a requirement for CE marking. The VFD shall meet product standard EN 61800-3 for the First Environment restricted level.
  - c. The entire VFD enclosure, including the bypass shall be seismically certified and labeled as such in accordance with the 2006 International Building Code (IBC):
    - 1) VFD manufacturer shall provide Seismic Certification and Installation requirements at time of submittal.
    - 2) Seismic importance factor of 1.5 rating is required, and shall be based upon actual shake test data as defined by ICC AC-156.
    - 3) Seismic ratings based upon calculations alone are not acceptable. Certification of Seismic rating must be based on testing done in all three axis of motion.
  - d. Acceptable Manufactures
    - 1) ABB ACH Series.
    - 2) Yasakawa
    - 3) Danfoss
  - e. The VFD manufacturer shall have available a comprehensive, HVAC Drive Computer Based Training (CBT) product. The CBT product shall include detailed, interactive sections covering VFD unpacking, proper mechanical and electrical installation, and programming. The CBT product shall allow the user to provide just-in-time training to new personnel or refresher training for maintenance and repair personnel on the user's site. The CBT product shall be repeatable, precise and shall include record keeping capability. The CBT product shall record answers to simulations and tests by student ID number. The CBT product must be professionally produced and have interactive sections, student tests, and include video clips of proper wiring and installation.

C. Submittals

- 1. Submittals shall include the following information:
  - a. Outline dimensions, conduit entry locations and weight.
  - b. Customer connection and power wiring diagrams.
  - c. Complete technical product description includes a complete list of options provided. Any portions of this specification not met must be clearly indicated or the

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- supplier and contractor shall be liable to provide all additional components required to meet this specification.
- d. Compliance to IEEE 519 – harmonic analysis for jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD).
    - 1) The VFD manufacturer shall provide calculations; specific to this installation, showing total harmonic voltage distortion is less than 5%. Input filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE standard 519. All VFD's shall include a minimum of 5% impedance reactors, no exceptions.
- D. The VFD package as specified herein shall be enclosed in a UL Listed Type enclosure, exceeding NEMA enclosure design criteria (enclosures with only NEMA ratings are not acceptable), completely assembled and tested by the manufacturer in an ISO9001 facility. The VFD tolerated voltage window shall allow the VFD to operate from a line of +30% nominal, and -35% nominal voltage as a minimum.
- 1. Environmental operating conditions: VFDs shall be capable of continuous operation at 0 to 50°C (32 to 122°F) ambient temperature as per VFD manufacturers documented/submittal data or VFD must be oversized to meet these temperature requirements. Not acceptable are VFD's that can only operate at 40°C intermittently (average during a 24 hour period) and therefore must be oversized. Altitude 0 to 3300 feet above sea level, less than 95% humidity, non-condensing. All circuit boards shall have conformal coating.
  - 2. Enclosure shall be rated UL Type 1 and shall be UL listed as a plenum rated VFD. VFD's without these ratings are not acceptable. NEMA only type 1 enclosures are not acceptable (must be UL Type 1).
- E. All VFDs shall have the following standard features:
- 1. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.
  - 2. The VFD shall have code-required disconnecting means.
  - 3. The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Hand" and "Auto" modes. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.
  - 4. There shall be a built-in time clock in the VFD keypad. The clock shall have a battery back up with 10 years minimum life span. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. If the battery fails, the VFD shall automatically revert to hours of operation since initial power up. Capacitor back-up is not acceptable. The clock shall also be programmable to control start/stop functions, constant speeds, PID parameter sets and output Form-C relays. The VFD shall have a digital input that allows an override to the time clock (when in the off mode) for a programmable time frame. There shall be four (4) separate, independent timer functions that have both weekday and weekend settings.
  - 5. The VFD's shall utilize pre-programmed application macros specifically designed to facilitate start-up. The Application Macros shall provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time. The VFD shall have two user macros to allow the end-user to create and save custom settings.



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6. The VFD shall have cooling fans that are designed for easy replacement. The fans shall be designed for replacement without requiring removing the VFD from the wall or removal of circuit boards. The VFD cooling fans shall operate only when required. To extend the fan and bearing operating life, the VFD shall cycle the cooling fans on and off as required.
7. The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to set point without tripping or component damage (flying start).
8. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.
9. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430.250 for 4-pole motors.
10. The VFD shall have internal 5% impedance reactors to reduce the harmonics to the power line and to add protection from AC line transients. The 5% impedance may be from dual (positive and negative DC bus) reactors, or 5% AC line reactors. VFD's with only one DC reactor shall add an AC line reactor.
11. The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices, and source transformers to be oversized per NEC 430.120. Input and output current ratings must be shown on the VFD nameplate.
12. The VFD shall include a coordinated AC transient surge protection system consisting of 4-120 joule rated MOV's (phase to phase and phase to ground), a capacitor clamp, and 5% impedance reactors.
13. The VFD shall provide a programmable loss-of-load (broken belt / broken coupling) Form-C relay output. The drive shall be programmable to signal the loss-of-load condition via a keypad warning, Form-C relay output, and / or over the serial communications bus. The loss-of-load condition sensing algorithm shall include a programmable time delay that will allow for motor acceleration from zero speed without signaling a false loss-of-load condition.
14. The VFD shall have user programmable underload and overload curve functions to allow user defined indications of broken belt or mechanical failure / jam condition causing motor overload
15. The VFD shall include multiple "two zone" PID algorithms that allow the VFD to maintain PID control from two separate feedback signals (4-20mA, 0-10V, and / or serial communications). The two zone control PID algorithm will control motor speed based on a minimum, maximum, or average of the two feedback signals. All of the VFD PID controllers shall include the ability for "two zone" control.
16. If the input reference (4-20mA or 2-10V) is lost, the VFD shall give the user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, Form-C relay output and / or over the serial communication bus.
17. The VFD shall have programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped from the level of a process feedback signal.

F. All VFDs to have the following adjustments:

1. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed. The lockout range must be fully adjustable, from 0 to full speed.

2. Two (2) PID Set point controllers shall be standard in the drive, allowing pressure or flow signals to be connected to the VFD, using the microprocessor in the VFD for the closed-loop control. The VFD shall have 250 ma of 24 VDC auxiliary power and be capable of loop powering a transmitter supplied by others. The PID set point shall be adjustable from the VFD keypad, analog inputs, or over the communications bus. There shall be two independent parameter sets for the PID controller and the capability to switch between the parameter sets via a digital input, serial communications or from the keypad. The independent parameter sets are typically used for night setback, switching between summer and winter set points, etc.
3. There shall be an independent, second PID loop that can utilize the second analog input and modulate one of the analog outputs to maintain the set point of an independent process (ie. valves, dampers, etc.). All set points, process variables, etc. to be accessible from the serial communication network.
4. Two (2) programmable analog inputs shall accept current or voltage signals.
5. Two (2) programmable analog outputs (0-20ma or 4-20 ma). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, Active Feedback, and other data.
6. Six (6) programmable digital inputs for maximum flexibility in interfacing with external devices. All digital inputs shall be programmable to initiate upon an application or removal of 24VDC or 24VAC.
7. Three (3) programmable, digital Form-C relay outputs. The relay outputs shall include programmable on and off delay times and adjustable hysteresis. The relays shall be rated for maximum switching current 8 amps at 24 VDC and 0.4 A at 250 VAC; Maximum voltage 300 VDC and 250 VAC; continuous current rating of 2 amps RMS. Outputs shall be true Form-C type contacts; open collector outputs are not acceptable.
8. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications), the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop and the damper shall be commanded to close. The keypad shall display "start enable 1 (or 2) missing". The safety input status shall also be transmitted over the serial communications bus.
9. The VFD control shall include a programmable time delay for VFD start and a keypad indication that this time delay is active. A Form C relay output provides a contact closure to signal the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates. The time delay shall be field programmable from 0 – 120 seconds. Start delay shall be active regardless of the start command source (keypad command, input contact closure, time-clock control, or serial communications), and when switching from drive to bypass.
10. Seven (7) programmable preset speeds.
11. Two independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.
12. The VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise. The VFD shall have selectable software for optimization of motor noise, energy consumption, and motor speed control.
13. The VFD shall include a carrier frequency control circuit that reduces the carrier frequency based on actual VFD temperature that allows higher carrier frequency settings without derating the VFD.

14. The VFD shall include password protection against parameter changes.
- G. The Keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). All VFD faults shall be displayed in English words. The keypad shall include a minimum of 14 assistants including:
1. Start-up assistant
  2. Parameter assistants
    - a. PID assistant
    - b. Reference assistant
    - c. I/O assistant
    - d. Serial communications assistant
    - e. Option module assistant
    - f. Panel display assistant
    - g. Low noise set-up assistant
  3. Maintenance assistant
  4. Troubleshooting assistant
  5. Drive optimizer assistants
- H. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):
1. Output Frequency
  2. Motor Speed (RPM, %, or Engineering units)
  3. Motor Current
  4. Motor Torque
  5. Motor Power (kW)
  6. DC Bus Voltage
  7. Output Voltage
- I. The VFD shall include a fireman's override input. Upon receipt of a contact closure from the fire / smoke control station, the VFD shall operate in one of two modes: 1) Operate at a programmed predetermined fixed speed ranging from -500Hz (reverse) to 500Hz (forward). 2) Operate in a specific fireman's override PID algorithm that automatically adjusts motor speed based on override set point and feedback. The mode shall override all other inputs (analog/digital, serial communication, and all keypad commands), except customer defined safety run interlocks, and force the motor to run in one of the two modes above. "Override Mode" shall be displayed on the keypad. Upon removal of the override signal, the VFD shall resume normal operation, without the need to cycle the normal digital input run command.
- J. Serial Communications
1. The VFD shall have an EIA-485 port as standard. The protocols shall be Modbus, Johnson Controls N2, Siemens Building Technologies FLN, BACnet, LonWorks, Profibus, EtherNet, BACnet IP, and DeviceNet. Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be "certified" by the governing authority (i.e. BTL Listing for BACnet). Use of non-certified protocols is not allowed.
  2. The BACnet connection shall be an EIA-485, MS/TP interface operating at 9.6, 19.2, 38.4, or 76.8 Kbps. The connection shall be tested by the BACnet Testing Labs (BTL)

- and be BTL Listed. The BACnet interface shall conform to the BACnet standard device type of an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:
- a. Data Sharing – Read Property – B.
  - b. Data Sharing – Write Property – B.
  - c. Device Management – Dynamic Device Binding (Who-Is; I-Am).
  - d. Device Management – Dynamic Object Binding (Who-Has; I-Have).
  - e. Device Management – Communication Control – B.
3. If additional hardware is required to obtain the BACnet interface, the VFD manufacturer shall supply one BACnet gateway per drive. Multiple VFDs sharing one gateway shall not be acceptable.
  4. Serial communication capabilities shall include, but not be limited to; run-stop control, speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, accel/decel time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the DDC to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The DDC shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible.
  5. Serial communication in bypass shall include, but not be limited to; bypass run-stop control, the ability to force the unit to bypass, and the ability to lock and unlock the keypad. The bypass shall have the capability of allowing the DDC to monitor feedback such as, current (in amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The DDC shall also be capable of monitoring the bypass relay output status, and all digital input status. All bypass diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote bypass fault reset shall be possible.
  6. The VFD / bypass shall allow the DDC to control the drive and bypass digital and analog outputs via the serial interface. This control shall be independent of any VFD function. The analog outputs may be used for modulating chilled water valves or cooling tower bypass valves. The drive and bypass' digital (Form-C relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. In addition, all of the drive and bypass' digital inputs shall be capable of being monitored by the DDC system. This allows for remote monitoring of which (of up to 4) safeties are open.
  7. The VFD shall include an independent PID loop for customer use. The independent PID loop may be used for cooling tower bypass value control, chilled water value / hot water valve control, etc. Both the VFD PID control loop and the independent PID control loop shall continue functioning even if the serial communications connection is lost. As default, the VFD shall keep the last good set point command and last good DO & AO commands in memory in the event the serial communications connection is lost and continue controlling the process.
- K. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level with up to 100 feet of motor cable. No Exceptions. Certified test reports shall be provided with the submittals confirming compliance to EN 61800-3, First Environment.

- L. All VFD's through 75HP at 480 V shall be protected from input and output power mis-wiring. The VFD shall sense this condition and display an alarm on the keypad. The VFD shall not sustain damage from this power mis-wiring condition.
- M. Features – Features to be furnished and mounted by the drive manufacturer. All features shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label.
  - 1. A complete factory wired and tested bypass system consisting of an output contactor and bypass contactor per section 2.01K below.
  - 2. Fieldbus adapters - Protocols such as LonWorks, DeviceNet, Ethernet IP (ControlNet over Ethernet & ModBus TCP), BACnet IP, and Profibus shall be provided. Coordinate with appropriate communications protocol with BMS vendor.
- N. Bypass Controller
  - 1. A complete factory wired and tested bypass system consisting of a door interlocked, padlockable circuit breaker, output contactor, bypass contactor, and fast acting VFD input fuses are required. UL Listed motor overload protection shall be provided in both drive and bypass modes.
  - 2. The bypass enclosure door and VFD enclosure must be mechanically interlocked such that the disconnecting device must be in the "Off" position before either enclosure may be accessed. Provide bypass interlock for use by qualified personnel. Bypass contactor shall be NEMA rated and shall be equipped with solid-state electronic overloads.
  - 3. The VFD and bypass package shall have a UL listed short circuit current rating (SCCR) of 100,000 amps and this rating shall be indicated on the UL data label.
  - 4. The drive and bypass package shall be seismic certified and labeled to the IBC:
    - a. Seismic importance factor of 1.5 rating is required, and shall be based upon actual shake table test data as defined by ICC AC-156.
  - 5. Drive Isolation Fuses - To ensure maximum possible bypass operation, fast acting fuses, exclusive to the VFD, shall be provided to allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection. This maintains bypass operation capability in the event of a VFD failure. Bypass designs which have no such fuses, or that incorporate fuses common to both the VFD and the bypass, will not be accepted.
  - 6. The system (VFD and Bypass) tolerated voltage window shall allow the system to operate from a line of +30%, -35% nominal voltage range. The system shall incorporate circuitry that will allow the drive or bypass contactor to remain "sealed in" over this voltage tolerance at a minimum.
  - 7. The bypass shall maintain positive contactor control through the voltage tolerance window of nominal voltage +30%, -35%. This feature is designed to avoid contactor coil failure during brown out / low line conditions and allow for input single phase operation when in the VFD mode. Designs that will not allow input single phase operation in the VFD mode are not acceptable.
  - 8. Motor protection from single phase power conditions - the bypass system must be able to detect a single phase input power condition while running in bypass, disengage the motor in a controlled fashion, and give a single phase input power indication. Bypass systems not incorporating single phase protection in bypass mode are not acceptable.
  - 9. The bypass system shall NOT depend on the VFD for bypass operation. The bypass system shall be designed for stand alone operation and shall be completely functional in both Hand and Automatic modes even if the VFD has been removed from the system for repair / replacement. Serial communications shall remain functional even with the VFD removed.

10. Serial communications – the bypass shall be capable of being monitored and / or controlled via serial communications. On-board communications protocols shall include ModBus; Johnson Controls N2; Siemens Building Technologies FLN (P1); and BACnet.
11. Serial communication capabilities shall include, but not be limited to; bypass run-stop control; the ability to force the unit to bypass; and the ability to lock and unlock the keypad. The bypass shall have the capability of allowing the DDC to monitor feedback such as, current (in amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The DDC shall also be capable of monitoring the bypass relay output status, and all digital input status. All bypass diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote bypass fault reset shall be possible. The following additional status indications and settings shall be transmitted over the serial communications bus and / or via a Form-C relay output – keypad “Hand” or “Auto” selected, bypass selected, and broken belt indication. The DDC system shall also be able to monitor if the motor is running in the VFD mode or bypass mode over serial communications. A minimum of 50 field serial communications points shall be capable of being monitored in the bypass mode.
12. The bypass serial communications shall allow control of the bypass’ digital outputs via the serial interface. This control shall be independent of any bypass function or operating state. The bypass’ digital (relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. In addition, all of the bypass’ digital inputs shall be capable of being monitored by the DDC system.
13. There shall be an adjustable motor current sensing circuit for the bypass and VFD modes to provide proof of flow (broken belt) indication. The condition shall be indicated on the keypad display, transmitted over the building automation protocol and/or via a Form-C relay output contact closure. The broken belt indication shall be programmable to be a system (drive and bypass) indication. The broken belt condition sensing algorithm shall be programmable to cause only a warning or a fault and / or system shutdown.
14. The digital inputs for the system shall accept 24VAC or 24VDC. The bypass shall incorporate an internally sourced power supply and not require an external control power source. The bypass power board shall supply 250 ma of 24 VDC for use by others to power external devices.
15. There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad command, time-clock control, digital input, or serial communications) the bypass shall provide a dry contact closure that will signal the damper to open (motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a bypass system input and allows motor operation. Up to four separate safety interlock inputs shall be provided. When any safety is opened, the motor shall be commanded to coast to stop, and the damper shall be commanded to close. This feature will also operate in Fireman’s override / smoke control mode.
16. The bypass control shall monitor the status of the VFD and bypass contactors and indicate when there is a welded contactor contact or open contactor coil. This failed contactor condition shall be indicated on the bypass LCD display, programmed to fire a Form-C relay output, and / or over the serial communications protocol.
17. The bypass control shall include a programmable time delay for bypass start and keypad indication that this time delay is in process. A Form C relay output provides a contact closure to signal the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates at full speed in the bypass mode. The time delay shall be field programmable from 0 – 120 seconds.
18. There shall be a keypad adjustment to select manual or automatic transfer bypass. The user shall be able to select via keypad programming which drive faults will result in an automatic transfer to the bypass mode and which faults require a manual transfer to

- bypass. The user may select whether the system shall automatically transfer from drive to bypass mode on the following drive fault conditions:
- a. Over current
  - b. Over voltage
  - c. Under voltage
  - d. Loss of analog input
19. The following operators shall be provided:
- a. Bypass Hand-Off-Auto
  - b. Drive mode selector
  - c. Bypass mode selector
  - d. Bypass fault reset
20. The bypass shall include a two line, 20 character LCD display. The display shall allow the user to access and view:
- a. Energy savings – in US dollars
  - b. Bypass motor amps
  - c. Bypass input voltage– average and individual phase voltage
  - d. Bypass power (kW)
  - e. Bypass faults and fault logs
  - f. Bypass warnings
  - g. Bypass operating time (resettable)
  - h. Bypass energy (kilowatt hours – resettable)
  - i. I/O status
  - j. Parameter settings / programming
  - k. Printed circuit board temperature
21. The following indicating lights (LED type) or keypad display indications shall be provided. A test mode or push to test feature shall be provided.
- a. Power-on (Ready)
  - b. Run enable
  - c. Drive mode selected
  - d. Bypass mode selected
  - e. Drive running
  - f. Bypass running
  - g. Drive fault
  - h. Bypass fault
  - i. Bypass H-O-A mode
  - j. Automatic transfer to bypass selected
  - k. Safety open
  - l. Damper opening
  - m. Damper end-switch made
22. The Bypass controller shall have six programmable digital inputs, and five programmable Form-C relay outputs. This I/O allows for a total System (VFD and Bypass) I/O count of 24 points as standard. The bypass I/O shall be available to the BAS / DDC system even with the VFD removed.
23. The on-board Form-C relay outputs in the bypass shall be programmable for any of the following indications.
- a. System started
  - b. System running
  - c. Bypass override enabled
  - d. Drive fault
  - e. Bypass fault
  - f. Bypass H-O-A position
  - g. Motor proof-of-flow (broken belt)
  - h. Overload

- i. Bypass selected
  - j. Bypass run
  - k. System started (damper opening)
  - l. Bypass alarm
  - m. Over temperature
24. The bypass shall provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in VFD or Bypass mode. The remote start/stop contact shall operate in VFD and bypass modes. The terminal strip shall allow for independent connection of up to four (4) unique safety inputs.
25. The bypass shall include a supervisory control mode. In this bypass mode, the bypass shall monitor the value of the VFD's analog input (feedback). This feedback value is used to control the bypass contactor on and off state. The supervisory mode shall allow the user to maintain hysteresis control over applications such as cooling towers and booster pumps even with the VFD out of service.
26. The user shall be able to select the text to be displayed on the keypad when an external safety opens. Example text display indications include "FireStat", "FreezStat", "Over pressure" and "Low suction". The user shall also be able to determine which of the four (4) safety contacts is open over the serial communications connection.
27. Smoke Control Override Mode (Override 1) – The bypass shall include a dedicated digital input that will transfer the motor from VFD mode to Bypass mode upon receipt of a dry contact closure from the Fire / Smoke Control System. The Smoke Control Override Mode action is not programmable and will always function as described in the bypass User's Manual documentation. In this mode, the system will ignore low priority safeties and acknowledge high priority safeties as required by UL 864/UUKL. All keypad control, serial communications control, and normal customer start / stop control inputs will be disregarded. This Smoke Control Mode shall be designed to meet the intent of UL864/UUKL.
28. Fireman's Override Mode (Override 2) – the bypass shall include a second, programmable override input which will allow the user to configure the unit to acknowledge some digital inputs, all digital inputs, ignore digital inputs or any combination of the above. This programmability allows the user to program the bypass unit to react in whatever manner the local Authority Having Jurisdiction (AHJ) requires. The Override 2 action may be programmed for "Run-to-Destruction". The user may also force the unit into Override 2 via the serial communications link.
29. Class 10, 20, or 30 (programmable) electronic motor overload protection shall be included.
30. The VFD Product Warranty shall be 24 months from the date of certified start-up, not to exceed 30 months from the date of shipment. The warranty shall include all parts, labor, travel time and expenses. A toll free 24/365 technical support line shall be available.

## 2.3 SOLID-STATE REDUCED-VOLTAGE MOTOR STARTERS

- A. Manufacturers: Subject to compliance with the requirements, manufacturers offering products that may be suitable for use on this project include, but are not limited to, the following or approved equal:
- 1. Allen-Bradley
  - 2. Eaton/Cutler-Hammer
  - 3. General Electric
  - 4. Schneider Electric/Square D
  - 5. Siemens



**B. Reduced Voltage Motor Starters**

1. The solid-state reduced-voltage starters shall be UL and CSA listed. The solid-state reduced-voltage starter shall be an integrated unit with power SCRs, logic board, paralleling bypass contactor, and electronic overload relay enclosed in a single housing.
2. The SCR-based power section shall consist of six (6) back-to-back SCRs and shall be rated for a minimum peak inverse voltage rating of 1500 volts PIV.
3. Units using triacs or SCR/diode combinations shall not be acceptable.
4. Resistor/capacitor snubber networks shall be used to prevent false firing of SCRs due to dv/dt effects.
5. The logic board shall be mounted for ease of testing, service and replacement. It shall have quick disconnect plug-in connectors for current transformer inputs, line and load voltage inputs and SCR gate firing output circuits.
6. The logic board shall be identical for all ampere ratings and voltage classes and shall be conformally coated to protect environmental concerns.
7. The paralleling run bypass contactor shall energize when the motor reaches 90 of full speed and close/open under one (1) times motor current.
8. The paralleling run bypass contactor shall utilize an intelligent coil controller to limit contact bounce and optimize coil voltage during varying system conditions.
9. The coil shall have a lifetime warranty.
10. Starter shall be provided with solid-state electronic overload protection as standard and shall be based on inverse time-current algorithm. Overload protection shall be capable of being disabled during ramp start for long acceleration loads via a DIP switch setting on the device keypad.
11. Overload protection shall be adjusted via the device keypad and shall have a motor full load ampere adjustment from 30 to 100% of the maximum continuous ampere rating of the starter.
12. Starter shall have selectable solid-state electronic overload class setting of 5, 10, 20 or 30 via a DIP switch setting on the device keypad.
13. Starter shall be capable of either an electronic or mechanical reset after a fault.
14. Units using bimetal overload relays are not acceptable.
15. Over temperature protection (on heat sink) shall be standard.
16. Starters shall provide protection against improper line-side phase rotation as standard. Starter will shut down if a line-side phase rotation other than A-B-C exists. This feature can be disabled via a DIP switch on the device keypad.
17. Starters shall provide protection against a phase loss or unbalance condition as standard. Starter will shut down if a 50% current differential between any two phases is encountered. This feature can be disabled via a DIP switch on the device keypad.
18. Start shall provide protection against a motor stall condition as standard. This feature can be disabled via a DIP switch on the device keypad.
19. Starter shall provide protection against a motor jam condition as standard. This feature can be disabled via a DIP switch on the device keypad.
20. Starter shall be provided with a form C normally open (NO), normally closed (NC) contact that shall change state when a fault condition exists. Contacts shall be rated 60 VA (resistive load) and 20 VA (inductive load). In addition, an LED display on the device keypad shall indicate type of fault (Overtemp, Phase Loss, Jam, Stall, Phase Reversal, and Overload).
21. The following control function adjustments on the device keypad are required:
  - a. Selectable Torque Ramp Start or Current Limit Start
  - b. Adjustable Kick Start Time, 0-2 seconds
  - c. Adjustable Kick Start torque, 0-85%
  - d. Adjustable Ramp Start Time; 0.5-180 seconds
  - e. Adjustable Initial Starting Ramp Torque; 0-85%

- f. Adjustable Smooth Stop Ramp Time; 0-60 seconds.
  - 22. Maximum continuous operation shall be at 115% of continuous ampere rating.
- C. Enclosures:
  - 1. The enclosures shall be wall mountable NEMA 1 for indoor and NEMA 3R for outdoor installation.
  - 2. Starters shall have a heavy-duty fusible type disconnect switch with UL Class R or Class J fuses.
- D. Options:
  - 1. Each starter shall be equipped with HOA selector switch, start-stop pushbuttons, red “run” pilot light, green “stop” pilot light and two (2) NO/2 NC auxiliary contacts, as indicated on the drawings.
- E. Factory Testing:
  - 1. Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.
  - 2. The manufacturer shall provide three (3) certified copies of factory test reports.
- F. Field Quality Control:
  - 1. Provide the services of a qualified factory-trained manufacturer’s representative to assist the Contractor in installation and start-up of the equipment specified under this section. The manufacturer’s representative shall provide technical direction and assistance to the Contractor in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained herein.
  - 2. The following minimum work shall be performed by the Contractor under the technical direction of the manufacturer’s service representative.
    - a. Inspection and final adjustments
    - b. Operational and functional checks of controllers/starters and spare parts.
  - 3. The Contractor shall provide three (3) copies of the manufacturer’s field start-up report.
- G. Manufacturer’s Certification:
  - 1. A qualified factory-trained manufacturer’s representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer’s recommendations.
  - 2. The Contractor shall provide three (3) copies of the manufacturer’s representative’s certification.
- H. Training:
  - 1. The Contractor shall provide a training session for up to five (5) owner’s representatives for 2 normal workdays at a jobsite location determined by the owner.
  - 2. The training representative shall be conducted by a manufacturer’s qualified representative.
  - 3. The training program shall consist of the following:
    - a. Instructions on the proper maintenance and operation of the equipment.

## 2.4 MOTOR STARTERS AND CONTROLS

A. All motor controllers and starters integral shall be in accordance with the following:

1. All individually mounted motor controllers and starters shall be of the following type:
  - a. Combination fused switch and magnetic controller with solid-state overload protection and low voltage protection.
  - b. Manual toggle switch operation 2 pole or single pole starter with overload protection in approved NEMA enclosure. Where motors are installed remote from starters, provide pilot light.
2. Provide UL Class RK-1 time-delay, current limiting fuses for all combination starters. Fuses shall be selected based on the fuse manufacturer's motor sizing tables and shall be coordinated with the upstream **fuse** or circuit breaker.
3. Starters shall be NEMA rated contactors with solid-state electronic motor overload protection.
4. All starters shall be provided with thermal overload protection in all phase legs. Starters for 3-phase motors shall be equipped solid-state electronic overload units, which shall also provide single phase protection. Single phase manual starters shall be equipped with melting alloy overload relays.
5. Provide all starters with an external overload reset button, mounted in the starter cover.
6. Provide three-position, maintained contact rotary selector switch (H-O-A) in starter covers for all automatically controlled motors. Pushbuttons are not required where H-O-A switches are used.
7. Provide 120V control power transformers in all controllers. Control power transformers shall be provided with two primary and one secondary fuse. Fuses shall be UL Class CC time delay type.
8. Provide all necessary auxiliary contacts in starters as required. Provide time delay relays for all interlocked motors.
9. All pilot lights shall be LED type with red or green jewel as indicated. Provide pilot lights where required as follows:
  - a. Starters with start-stop pushbutton: 1 pilot light to indicate "Motor On".
  - b. Starters with H-O-A switches: 1 pilot light to indicate "Motor On".
10. Each controller, mounted in NEMA type enclosure. Enclosures shall be as follows:
  - a. Exterior: NEMA 4X stainless steel.
  - b. Interior, dry locations: NEMA 1.
  - c. Boiler rooms: NEMA 12.
11. Enclosure sizes and wiring terminals shall be suitable for the use of copper power and control conductors.
12. Starters shall be subject to the approval, as to limit of inrush current, as set up by the Utility Company. In general, magnetic starters shall be located close to the equipment controlled.

## 2.5 REMOTE DEVICES

- A. Remote "Hand-off-auto" selector switch, pilot light, and similar devices, shall be of same manufacture as the associated starter, and shall be oiltight.
- B. Remote pilot light shall be LED type.
- C. Remote contact making devices shall be pilot duty rated.

## 2.6 FACTORY FURNISHED CONTROL PANELS

- A. The packaged control panel furnished with duplex pumps and compressors shall be provided with a circuit breaker and a magnetic starter with solid-state electronic overloads for each motor. The incoming line lugs shall be arranged to accept a separate branch circuit to each circuit breaker. A control power transformer shall be provided and served via a transfer relay with power taken from the load side of each incoming line circuit breaker. If the two (2) electric services are from different power sources, one being an emergency generator, a transfer switch shall be provided in lieu of the transfer relay.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Motors installed, not in strict compliance with the above, shall be replaced at no cost to the Owner.

### 3.2 ELECTRICAL WIRING

- A. Provide all necessary wiring diagrams indicating wire size and connections as required for the proper operation of the equipment.
- B. Contractor shall be responsible for replacing all fuses in the electrical systems during construction which blow due to tests or malfunction of his motorized or non-motorized electrical equipment.

### 3.3 INSTALLATION

- A. Assembly:
  - 1. Assemble shipping sections and set motor control centers in place level, plumb and in alignment; with channel sills level over their full length on surface of housekeeping pads.
  - 2. Make required mechanical and electrical connections including those indicated on approved shop drawings.
  - 3. Touch-up paint all marred factory finishes.
- B. Overload Elements:
  - 1. Provide in accordance with motor nameplate current, service factor and ambient temperature.
  - 2. With clamp-on ammeter verify loading of motors. Adjust solid-starter overload setting per the manufacturer's instructions.
- C. Tighten and torque electrical connections in accordance with manufacturer's instruction and UL 486.

3.4 TESTING

- A. Coordinate testing of starter with testing of the motor and the system associated with the motor.

3.5 VFD Installation

- A. Installation shall be the responsibility of the mechanical contractor. The contractor shall install the drive in accordance with the recommendations of the VFD manufacturer as outlined in the VFD installation manual.
- B. Mechanical Contractor shall engage Electrical Contractor's services for connecting power to the load side of the equipment. Power wiring shall be completed, to NEC code 430.122 wiring requirements based on the VFD input current. Caution: VFDs supplied without internal reactors have substantially higher input current ratings, which may require larger input power wiring and branch circuit protection. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

**END OF SECTION 23 0514**



## **SECTION 23 0548 – NOISE AND VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Inertia bases.
2. Vibration isolators.
3. Duct silencers.
4. Cross-talk silencers.
5. Acoustic housings.
6. Ductwork lagging.
7. Acoustical louvers.

**B. Related Sections:**

1. Section 03 3000 - Cast-In-Place Concrete: Execution requirements for placement of isolators in floating floor slabs specified by this section and product requirements for concrete for placement by this section.
2. Section 07 9000 - Joint Protection: Product requirements for joint sealers specified for placement by this section.
3. Section 08 9100 - Louvers: Product requirements for acoustic wall louvers.
4. Section 23 0529 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports.
5. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC: Requirements for sound and vibration measurements performed independent of this section.
6. Section 23 3300 - Air Duct Accessories: Product requirements for both solid and flexible duct connectors for duct silencers specified for placement by this section.

#### **1.2 REFERENCES**

**A. Air Movement and Control Association International, Inc.:**

1. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

**B. American National Standards Institute:**

1. ANSI S1.4 - Sound Level Meters.
2. ANSI S1.8 - Reference Quantities for Acoustical Levels.
3. ANSI S1.13 - Methods for the Measurement of Sound Pressure Levels in Air.
4. ANSI S12.36 - Survey Methods for the Determination of Sound Power Levels of Noise Sources.

**C. Air-Conditioning and Refrigeration Institute:**

1. ARI 575 - Method of Measuring Machinery Sound within Equipment Space.

- D. American Society of Heating, Refrigerating and:
  - 1. ASHRAE 68 - Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans.
  - 2. ASHRAE Handbook - HVAC Applications.
- E. ASTM International:
  - 1. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  - 2. ASTM E477 - Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.
  - 3. ASTM E596 - Standard Test Method for Laboratory Measurement of the Noise Reduction of Sound-Isolating Enclosures.
- F. Sheet Metal and Air Conditioning Contractors':
  - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

### 1.3 PERFORMANCE REQUIREMENTS

- A. Provide vibration isolation on motor driven equipment over 0.5 hp (0.35 kW), which is connected piping and ductwork.
- B. Maintain sound level of spaces at levels not to exceed those listed below by utilizing acoustical devices.
- C. Maintain rooms at following maximum sound levels, in Noise Criteria (NC) as defined by ASHRAE Handbook., HVAC Applications:
  - 1. Offices
    - a. Executive: 25
    - b. Conference rooms: 25
    - c. Private: 30
    - d. Open-plan areas: 35
    - e. Computer/business machine areas: 40
    - f. Public circulation: 40
    - g. Laboratories: 40
    - h. Corridors: 40
    - i. Public areas: 40
  - 2. Schools
    - a. Lecture and classrooms: 30
    - b. Open-plan classrooms: 30



#### 1.4 SUBMITTALS

- A. Section 01 3300 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate inertia bases and locate vibration isolators, with static and dynamic load on each. Indicate assembly, materials, thickness, dimensional data, pressure losses, acoustical performance, layout, and connection details for sound attenuation products fabricated for this project.
- C. Product Data: Submit schedule of vibration isolator type with location and load on each. Submit catalog information indicating, materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.
- D. Design Data: Submit calculations indicating maximum room sound levels are not exceeded.
- E. Test Reports: Indicate dynamic insertion loss and noise generation values of silencers. Acoustic housings meet or exceed specified sound transmission loss values.
- F. Manufacturer's Installation Instructions: Submit special procedures and setting dimensions. Indicate installation requirements maintaining integrity of sound isolation.
- G. Manufacturer's Certificate: Certify isolators meet or exceed specified requirements.
- H. Manufacturer's Field Reports: Indicate sound isolation installation is complete and in accordance with instructions.
- I. Submit shop drawings for the items listed below. The shop drawings must be complete when submitted and must be presented in a clear, easily understood form. Incomplete or unclear presentation of shop drawings may be reason for rejection.
  - 1. A complete description of products to be supplied, including product data, dimensions, specifications and installation instructions.
  - 2. Detailed selection data for each vibration isolator supporting equipment, including:
    - a. The equipment identification mark
    - b. The isolator type
    - c. The actual load
    - d. The static deflection expected under the actual load
    - e. The specified minimum static deflection
  - 3. Steel rails, steel base frames and concrete inertia bases showing all steel work, reinforcing, vibration isolator mounting attachment method and location of equipment attachment bolts.
  - 4. Details required to convey complete understanding of work.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 7000 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of acoustic housings and ductwork lagging. Record actual locations of hangers including attachment points.

## 1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with AMCA 300, ANSI S1.13, ARI 575, ANSI S12.36 standards and recommendations of ASHRAE 68.
- B. All vibration isolation systems including mountings, and hangers, shall be furnished by the same manufacturer.
- C. The vibration isolation systems shall be designed to achieve an 80% to 95% isolation at the lowest rotational speed of the equipment regardless of the condition of the mounting floor.
- D. The flexible isolators shall be properly adjusted and installed in accordance with the weight distribution of the equipment to provide a stable mounting decoupled system. Each flexible isolator shall be designed and installed so that the equipment support base remains level during deflection. The natural frequency for each support point, based upon the load per isolator and its stiffness, shall not differ by more than plus or minus 10%.
- E. The isolation system shall not cause the equipment to generate any mechanical problem, mechanical failure or misalignment of the couplings and bearings.
- F. Furnish information as may be required to verify that all vibration control equipment will meet static deflections and percentage of isolation reduction specified for various uses.
  - 1. Should operation of any system cause noise or vibration which is, in the opinion of the Engineer, "objectionable," Contractor shall, at his own expense, make such changes in piping, equipment, etc., as may be necessary to eliminate the objectionable noise or vibration.
  - 2. Should the installation of any equipment or piping transmit the noise to any portion of the structure which is, in the opinion of the Engineer, "objectionable," Contractor shall, at his own expense, install such isolation and make such changes or additions as may be necessary to prevent the transmission of the noise or vibration.
- G. Particular attention is directed to the problem of preventing noise and vibration transmission from Mechanical Equipment Rooms and Fan Rooms to adjacent areas. It is of paramount importance that no noise or vibration emanating from equipment in these rooms be perceptible in adjacent areas. Contractor shall incorporate in his installation all devices and accessories to accomplish this result. Such devices shall include vibration eliminator bases and sound absorber pads, muffler at air compressor air intakes, acoustical lining or sound traps at fresh air intake louvers, and other sound insulation, all as may be required.
- H. All electrical connections, drain connections, piping connections, etc., made to equipment which rests on vibration isolators shall be sufficiently flexible to permit the equipment to be properly installed.
- I. When concrete pads are called for to be under isolation, they shall be extended to span at least 2 of the supporting beams and they shall be reinforced with rods or mesh so that the concrete can act as a beam reinforcing the floor and providing a better support for the isolation. The vibration control equipment manufacturer shall submit templates and weight at each support point to the Concrete Section to achieve this.
- J. Where supplementary steel is required to support piping this steel shall be designed to provide a maximum deflection of 0.08 inches at the midspan under the supported load. Piping shall be

rigidly supported from the supplementary steel and the supplementary steel isolated from the building structure by means of isolators.

- K. Acoustical Performance Specifications: It is the intent that noise levels due to air conditioning and/or ventilating equipment, ducts, grilles, registers, diffusers and air system pressure reducing devices will permit attaining sound pressure levels in occupied spaces conforming to the following NC curves as explained in the latest issue of the ASHRAE Guide and Data Book.
- L. Design isolators for equipment installed outdoors to provide adequate restraint to withstand the force of a 100 mph wind applied to any exposed surface of the isolated equipment. Isolators for outdoor equipment shall have bolt holes for attachment to equipment and to supports. The vibration isolation Vendor shall submit verifying shear and over turning calculations, for their product and equipment installation arrangement, stamped by a licensed Professional. The design and supply of miscellaneous support steel above and below isolators will not be the responsibility of the vibration isolation manufacturer.
- M. Static deflection of isolators shall be as provided as noted below. All static deflections stated are the minimum acceptable deflection for the mounts under actual load. Isolators selected solely on the basis of rated deflections are not acceptable and will be disapproved.
- N. Vibration Criteria:
  - 1. Mechanical and electrical equipment operated by motors over one horsepower and unless otherwise noted, and associated piping and ductwork, shall be isolated from the structure by means of resilient vibration and noise isolators supplied by a single manufacturer to the HVAC Contractor. The isolator manufacturer shall include the complete design for the supplementary basis; a tabulation of the design data on the isolators including outside diameter; free, operating and solid heights of the springs; free and operating heights of the neoprene or fiberglass isolators; and isolation efficiency based on the lowest operating speed of the equipment supported.
  - 2. All rotating equipment shall be balanced both statically and dynamically. The equipment supporting structure shall not have any natural frequencies within  $\pm 20\%$  of the operating speeds. The equipment, while operating, shall not exceed a self-excited vibration velocity of 0.10 inches per second when measured with a vibration meter on the bearing caps of the machine in the vertical, horizontal and axial directions, or at the equipment mounting feet if the bearings are concealed.
  - 3. Vibration testing shall be in accordance with procedure established by "Testing Vibration Isolation Systems", Page 52.38 of ASHRAE HVAC Systems and Applications – 1987.
  - 4. When it is determined by the Owner that any equipment vibration exceeds the specified level, the contractor in consultation with the Professional shall, at no cost to the Owner, determine the source of the vibration and make the necessary corrections or replacement to reduce it to the acceptable level.
- O. Sound Pressure Levels:
  - 1. The sound pressure levels around mechanical and electrical equipment (boilers, fans, pumps, pressure reducing valves, motors, turbines, elevators, transformers, etc.) in equipment spaces shall not exceed 85 dbA at any point, 3 feet from equipment, with all equipment in the room operating. The sound criteria applies to the complete operating range of each piece of equipment.
  - 2. The maximum interior background sound pressure levels for the various usage areas within the building shall be indicated on Table 2, "Recommended Indoor Design Goals for HVAC System Sound Control" – ASHRAE HVAC Systems and Applications – 1987,

Page 52.4, or as otherwise specified. Each area, so designated, shall be tested and reported for noise level with all equipment operating and space unoccupied.

3. Equipment installed outside the building, at grade, in areaways, attached to walls, and on the roof, such as cooling tower fans, air conditioning units, refrigerant condensers, fans, exhaust silencers, air intakes, etc. shall comply with all local, city, state and federal sound level regulations.
4. When equipment or space sound pressure levels exceed the specified criteria, the contractor in consultation with the Professional shall, at no cost to the Department, determine the source of the noise and make the necessary corrections to reduce it to the acceptable levels.

## 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.
- C. Design application of duct silencers, acoustic housings, seismic snubbers under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of NC.

## 1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

## 1.9 WARRANTY

- A. Section 01 7000 - Execution and Closeout Requirements: Product warranties and product bonds.

# PART 2 - PRODUCTS

## 2.1 INERTIA BASES

- A. Manufacturers: Subject to compliance with the requirements, manufacturers offering products that may be suitable for use on this project include, but are not limited to, the following or approved equal:
  1. Mason Industries - M.I.I
  2. Vibration Eliminator Corp. – V.E.C
  3. VMC Group - V.M.C.I
  4. Substitutions: Section 01 6000 - Product Requirements.
- B. Furnish materials in accordance with NCBC.

C. Structural Bases:

1. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and snubbers.
2. Construction: Welded structural steel with gusset brackets, supporting equipment and motor with motor slide rails.

D. Concrete Inertia Bases:

1. Mass: Minimum of 1.5 times weight of isolated equipment.
2. Construction: Structured steel channel perimeter frame, with gusset brackets and anchor bolts, adequately reinforced, concrete filled.
3. Connecting Point: Reinforced to connect isolators and snubbers to base.
4. Concrete: Reinforced 3,000 psi (20 MPa) concrete.

2.2 MOUNTING OF CEILING SUPPORTED FACTORY ASSEMBLED FANS, TUBULAR FANS, AXIAL FANS AND BELTED UTILITY VENT SETS - MOUNTING TYPE V

- A. Hung by isolation with retainers containing steel springs and neoprene isolator element. Structural sub-base or unit integral supports if adequate as approved by Engineer. Isolators shall be as follows:

Type DNHS	-	M.I.I.
Type RSH	-	V.M.C.I.
Type SNRC	-	V.E.C.

- B. Diagonal hanger rod isolators shall be provided as required to limit horizontal motion to 1/4" maximum under fan operating conditions.

2.3 ROOF-MOUNTED AIR HANDLING UNITS – TYPE X

- A. Rooftop air handling units (RTU) will be supported by structural steel dunnage.
- B. For internal spring isolated units, the rigid connection to dunnage shall be provided.
- C. Provide wind bracing as required.
- D. All mounting hard wires and wind bracing shall be hot dipped galvanize.

2.4 MOUNTING OF CONTROL AIR COMPRESSORS AND CONDENSATE TANKS

- A. Air Compressors shall be mounted as described for pumps greater than 3 HP. Condensate pump tanks shall be mounted directly on one inch thick neoprene pad.

2.5 AIR COMPRESSOR AND GENERATOR FUEL OIL FLEXIBLE CONNECTORS

- A. Flexible stainless steel metal pipe connectors shall be installed in two (2) planes 90 deg. to each other in the discharge piping from the compressor. Flexible connectors shall have a

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minimum burst pressure of four times the operating pressure. Pipe sizes through 2" I.D. shall be furnished with hex male nipple fittings and pipe sizes 2-1/2" I.D. and larger shall be furnished with fixed steel flanges, both sides. Connectors shall be one of the following:

Type BSS	-	M.I.I.
Type MFP	-	V.M.C.I.

## 2.6 GRILLES, REGISTERS AND DIFFUSERS

- A. The maximum permissible sound power levels in octave bands of grilles, registers and diffusers when operated in an installed condition per plans and specification, shall be as follows:

### Maximum Sound Power Level for Terminal Devices Servicing Occupied Spaces

See Acoustical Performance Criteria  
Maximum PWL (db) re 10-12 Watts

<u>Octave Bands</u>	<u>NC-35</u>	<u>NC-40</u>
1	62	66
2	56	60
3	50	54
4	46	51
5	43	48
6	42	47
7	41	46
8	42	47

## 2.7 VARIABLE AIR VOLUME BOXES

- A. Discharge Noise:

- The maximum permissible sound power levels of these units when operated in an installed condition per plans and specifications shall be such that the resulting sound pressure levels in occupied spaces shall conform to noise criteria levels as stated in "Acoustical Performance Criteria" hereinbefore described. Low pressure duct downstream of units shall be acoustically lined but length of lining shall be not less than required to achieve criteria.

- B. Radiated Noise:

- Where located exposed or over occupied spaces, the maximum permissible radiated sound power levels in octave bands when operated in an installed condition per plans and specifications, shall be as follows:

<u>Octave Bands</u>	<u>Maximum PWL (db) re:10-12 Watts</u>	
<u>Mid/Freq. (cps)</u>	<u>NC-35</u>	<u>NC-40</u>
63	72	76

<u>Octave Bands</u> <u>Mid/Freq. (cps)</u>	<u>Maximum PWL (db) re:10-12 Watts</u>	
	<u>NC-35</u>	<u>NC-40</u>
125	70	74
250	61	65
500	60	64
1000	57	62
2000	56	60
4000	66	70
8000	65	70

2. The manufacturer shall submit to the Architect guaranteed discharge and radiated sound power levels in octave bands, and shall substantiate that the equipment operating in an installed condition as per plans and specifications shall conform with those discussed above.
3. Should the architect desire that units be checked for conformance of discharge and radiated noise to the above acoustical performance, the cost of such tests will be paid up by the Owner provided that the test proves conformance. Otherwise, the cost of such tests and cost of corrective measures shall be borne by the manufacturer.

## 2.8 ACOUSTICAL PERFORMANCE WITHIN EQUIPMENT SPACES

- A. Equipment room noise levels and noise transmission to adjacent buildings shall comply with all State and City Noise Ordinances.

## 2.9 MOTOR ACOUSTICAL PERFORMANCE

- A. Motor drives for pumps when installed per plans and specifications shall operate with noise levels not exceeding 90 dba.
- B. Noise levels shall be determined in accordance with IEEE Standard u/85 Test "Procedure for Air-Borne Noise Measurements on Rotating Electric Equipment."

## 2.10 RECTANGULAR FACTORY BUILT SOUND TRAPS

- A. Prefabricated duct silencers shall be constructed of all incombustible materials and shall be standard product of a responsible manufacturer. The shell of the silencer shall be at least 22 gauge galvanized steel sheet and shall be leakproof when subjected to a differential pressure of 8 inches w.g.
- B. Materials of construction shall be, in addition to the sheet-metal, mineral fiber, acoustic fiber, acoustic fill, completely covered by a moisture resistant barrier of Mylar. Mylar sheet shall be held away from the sheetmetal by a stand-off for D.I.L. improvement.
- C. Pressure drop shall not be greater than shown on the Sound Traps Schedule. Total system pressure before and after the sound traps shall be measured after the traps are installed. Should the pressure drop be greater than specified or scheduled, the Contractor shall replace the traps and/or modify the entrance or discharge aerodynamic flow to achieve the specified results. The cost of corrective measures shall be borne by the Contractor.

- D. The sound traps shall provide the following net insertion ratings under design air flow velocities as scheduled on the drawings. The ratings shall be determined by the duct to reverberant room test method. Units shall be tested with Mylar sheet.

<u>BANDS</u>	<u>BAND WIDTH CENTER FREQ. (CPS)</u>	<u>DYNAMIC NET INSERTION LOSS (DB)</u>				
		<u>SOUND TRAP TYPES</u>				
		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
2	123	10	14	18	20	13
3	250	18	24	24	35	18
4	500	30	36	40	45	28
5	1000	42	48	45	50	40
6	2000	34	44	46	48	47

The maximum db of sound self-generated by the above sound trap types shall not exceed the following sound power levels at face velocities at 1600 fpm.

<u>Bands</u>	<u>Band Width Center Freq. (cps)</u>	<u>Sound Power Level db re:</u>		
		<u>10-12 Watts Sound Trap Types</u>		
		<u>A,B,C</u>	<u>D</u>	<u>E</u>
2	125	54	29	51
3	250	52	35	51
4	500	50	30	49
5	1000	47	31	47
6	2000	48	35	50

- E. Certification: Certified test data of pressure drop and insertion loss rating shall be submitted by the Contractor for a 24 x 24 cross section rectangular trap or 24 inch diameter conical trap. The certification data for both pressure drop and insertion loss shall be based upon tests of the same trap for both measurements. The certifying laboratory shall be open to inspection and/or test of sound traps upon request of architect.
- F. Provide sound trap at each supply air fan discharge and as shown. Unless otherwise indicated, pressure drop across sound trap, under nominal flow conditions, shall not exceed 0.25" W.G.

## 2.11 ACOUSTICAL LINING

- A. Duct lining for supply, return and exhaust air systems:

1. Duct lining shall be 1-1/2 lb. per cu. ft. density Owens Corning AEROFLEX, Johns Manville or Knauf. Unless greater thicknesses are specified, the minimum thickness installed shall be 1-1/2".

Duct lining shall meet requirements of NFPA-90A and all materials used shall have a flamespread rating of 25 or less and smoke developed rating of no higher than 50.

2. The leading edge (facing into the air flow) or each non-abutting section such as the first section facing into the fan, or the first section after a sound trap shall have a metal nosing.



3. Application: All portions of duct designated to receive duct liner shall be completely covered with Duct Liner. Transverse joints shall be neatly butted and there shall be no interruptions or gaps. The black coated surface of the Duct Liner shall face the air stream. The Duct Liner shall be adhered to the sheet metal with 100% coverage of adhesive and all exposed leading edges and all transverse joints coated with adhesive. Adhesive shall Duct Line, ASC-A-7001C-1972. The Duct Liner shall be additionally secured with mechanical fasteners (mechanical fasteners shall conform to Mechanical Fastener Standard FM-1-1971, available from Sheet Metal and Air Conditioning Contractors National Association), which shall compress the Duct Liner sufficiently to hold it firmly in place. Duct Liner shall be cut to assure overlapped and compressed longitudinal corner joints. Fasteners shall start within 3" of the upstream transverse edges of the liner and 3" from the longitudinal joints and shall be spaced at a maximum of 6" o.c. around the perimeter of the duct, except that they may be a maximum of 6" from a corner break. Elsewhere they shall be a maximum of 16" o.c., except that they shall be placed not more than 6" from a longitudinal joint of the liner nor 12" from a corner break.
4. The following ducts shall be acoustically lined:
  - a. Ductwork downstream of VAV terminal units a minimum distance of 15 feet, in all directions, or as shown on drawings.
  - b. All supply and return air ductwork in mechanical equipment rooms, but not less than 30 ft. from supply fan discharge and 25 ft. from return fan inlets, in all branches and mains.
  - c. Ductwork upstream of exhaust fans a minimum distance of twenty feet, in all branches or mains, unless sound traps are provided.
  - d. All transfer ducts and jumper ducts.
  - e. In addition to above, wherever shown on drawings.

- B. Dimensions of lined ducts shown on drawings are the inside dimensions of the duct after the lining has been installed.
- C. Duct liner shall meet the requirements of NFPA 90A, 90B and ASTM-C 1071 and installed in accordance with SMACNA.
- D. All adhesives shall conform to the current South Coast Air Quality Management District (SCAQMD) Rule #1168. The Volatile Organic Compound (VOC) content shall not exceed 80 grams per liter.

## 2.12 DUCTWALL EXTERNAL SOUNDPROOFING (DES)

### A. Materials:

1. Fiberglass insulation shall be 4 lb. per cubic foot density.
2. Thickness of the fiberglass shall be 1/2 in. greater than height of ductwork angles, one in. minimum.
3. The jacket shall be aluminum (.016) laminated to lead (.015) with a visco-elastic film similar to Muffle-Jac as manufactured by Childers Products Company.
4. Sound transmission loss greater than STC26 for the aluminum/lead laminate.
5. Banding shall be .02 in.x 3/4 in. stainless steel.
6. Sealant: Chil-Seal CP-70 by Childers or equal.

### B. Installation:

1. Seal all duct joints airtight.

2. Adhere fiberglass with 100% coverage of adhesive and stick clips on 18 in., centers on the underside of large ducts where required. Fiberglass must cover angles and protrusions by 1/2 in. minimum. Wrap ductwork and insulation with lead/aluminum laminate with largest continuous sheets possible. Overlap all joints 2 in. minimum and seal joints with sealant specified. If fish-mouthing occurs, close gap with sheet metal screws as described below. On the underside of ducts only, stick clips may be used to support jacket. The exterior clip must be isolated from the jacket with an 1/8 in. thick oversized armaflex washer. All duct jacketing must be secured with banding on 12 in. maximum centers. The corners must be reinforced with 3 in. long, lin. x lin. x 1/8 in. thick aluminum extrusion where banding occurs. Use same extrusion under duct to keep jacket from sagging if required. If and only if the banding is not possible, then sheet metal screws (3/4 in. long maximum) may be used to secure the jacketing as described below:
  - a. Must not touch interior duct.
  - b. After screw has been installed, clean with nonflammable grease solvent.
  - c. Dab screw with epoxy adhesive to secure.

- C. Provide DES as shown on drawings only.

## 2.13 DUCTWORK LAGGING

- A. Acoustic Insulation: 2 inch (50 mm) thick, 3 to 5 lb/cu ft (50 to 80 kg/cu m) density glass fiber or mineral wool insulation.
- B. Covering: Gypsum board with surface weight minimum 4 lb/sq ft (20 kg/sq m).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 3000 - Administrative Requirements: Coordination and project conditions.
- B. Verify equipment, ductwork and piping is installed before work in this section is started.

### 3.2 INSTALLATION

- A. Support duct silencers rigidly to ductwork. Refer to Section 23 3300.
- B. Lag ductwork, where indicated by wrapping with insulation and covering. Apply covering to be airtight. Do not attach covering rigidly to ductwork.
- C. Install isolation for motor driven equipment.
- D. Bases:
  1. Set steel bases for 1 inch (25 mm) clearance between housekeeping pad and base.
  2. Set concrete inertia bases for 2 inch (50 mm) clearance between housekeeping pad and base.

- E. Adjust equipment level.
- F. Install spring hangers without binding.
- G. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.
- H. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- I. Provide pairs of horizontal limit springs on fans with more than 6.0 inch (1.5 kPa) static pressure, and on hanger supported, horizontally mounted axial fans.
- J. Provide resiliently mounted equipment, piping, and ductwork with seismic snubbers. Provide each inertia base with minimum of four seismic snubbers located close to isolators. Snub equipment designated for post disaster use to 0.05 inch (1.5 mm) maximum clearance. Provide other snubbers with clearance between 0.15 inch (4 mm) and 0.25 inch (7 mm).
- K. All equipment, piping, etc., shall be mounted on or suspended from approved foundations and supports, all as specified herein, as shown on the drawings, or as required.
- L. All floor-mounted equipment shall be erected on 4" high concrete pads over the complete floor area of the equipment, unless specified to the contrary herein. Wherever hereinafter vibration eliminating devices and/or concrete inertia blocks are specified, these items shall, in all cases, be in turn mounted upon 4" high concrete pads unless specified to the contrary herein.
- M. The vibration isolation systems shall be guaranteed to have minimum one inch deflection or as indicated on the schedule or as specified.
- N. Mounting sizes shall be determined by the mounting manufacturer, and the sizes shall be installed in accordance with the manufacturer's instruction.
- O. The installed vibration isolation system for each floor or ceiling supported equipment shall have a maximum lateral motion under equipment startup or shutdown conditions of 1/4". Motions in excess shall be restrained by approved spring type mountings.
- P. All mounting systems exposed to weather and other corrosive environments shall be protected with factory applied corrosion resistive materials.
- Q. Where steel spring isolation systems are described in the specifications, the mounting assemblies shall utilize bare springs with the spring diameter not less than 0.8 of the loaded operating height of the spring. Each spring isolator shall be designed and installed so that the ends of the spring remain parallel during and after the spring has reached specified minimum deflection. Springs shall have a reserve deflection of 50% of rated deflection before reaching solid.
- R. Vibration isolation equipment submittal drawings shall include the following information:
  - 1. Isolation mounting deflections.
  - 2. Spring diameters, compressed spring heights at rated load; solid spring heights, where steel spring isolation mountings are used.

3. Equipment operating speed.

- S. Unless noted otherwise, spring isolators for fans shall have minimum static deflection, when operating at their lowest speed, in accordance with the following table:

<u>FAN RPM</u>	<u>Minimum Static Deflection, Inches</u>
850 or higher	1"
600 to 850	2"
400 to 600	3"

- T. All neoprene isolators shall have a minimum static deflection of 3/8 inch unless otherwise shown.

3.3 FIELD QUALITY CONTROL

- A. Section 01 4000 - Quality Requirements and 01 7000 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect isolated equipment after installation and submit report. Include static deflections.
- C. After start-up, final corrections and balancing of systems take octave band sound measurements over full audio frequency range in areas adjacent to mechanical equipment rooms, duct and pipe shafts, and other critical locations. Provide one-third octave band measurements of artificial sound sources in areas indicated as having critical requirements. Submit complete report of test results including sound curves.
- D. Furnish services of testing agency to take noise measurement. Use meters meeting requirements of ANSI S1.4.

**END OF SECTION 23 0548**

## **SECTION 23 3300 – AIR DUCT ACCESSORIES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Back-draft dampers.
2. Combination fire-and-smoke dampers.
3. Duct access doors.
4. Dynamic fire dampers.
5. Smoke dampers.
6. Volume control dampers.
7. Remote cable control damper.
8. Flexible duct connections.
9. Duct test holes.
10. Dial thermometers.
11. Static pressure gages.

**B. Related Sections:**

1. Section 23 0900 - Instrumentation and Control for HVAC: Execution and Product requirements for connection and control of Combination Smoke and Fire Dampers for placement by this section.
2. Section 23 0923 - Direct-Digital Control System for HVAC: Execution and Product requirements for connection and control of Combination Smoke and Fire Dampers for placement by this section.
3. Section 23 3100 - HVAC Ducts and Casings: Requirements for duct construction and pressure classifications.
4. Section 26 0519 – Low Voltage Electrical Power Conductors and Cables: Execution requirements for connection of electrical Combination Smoke and Fire Dampers specified by this section.

#### **1.2 REFERENCES**

**A. Air Movement and Control Association International, Inc.:**

1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

**B. ASTM International:**

1. ASTM E1 - Standard Specification for ASTM Thermometers.

**C. National Fire Protection Association:**

1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
2. NFPA 92A - Recommended Practice for Smoke-Control Systems.

D. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
2. SMACNA – Fire, Smoke and Radiation Damper Installation Guide

E. Underwriters Laboratories Inc.:

1. UL 555 - Standard for Safety for Fire Dampers.
2. UL 555C - Standard for Safety for Ceiling Dampers.
3. UL 555S - Standard for Safety for Smoke Dampers.

1.3 SUBMITTALS

A. Section 01 3300 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers, duct access doors, and duct test holes.

C. Product Data: Submit data for shop fabricated assemblies and hardware used.

D. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.

1. Fire dampers including locations and ratings.
2. Smoke dampers including locations and ratings.
3. Backdraft dampers.
4. Flexible duct connections.
5. Volume control dampers.
6. Cable control dampers.
7. Duct access doors.
8. Duct test holes.

E. Product Data: For fire dampers, smoke dampers, and combination fire and smoke dampers, submit the following:

1. Include UL ratings, dynamic ratings, leakage, pressure drop and maximum pressure data.
2. Indicate materials, construction, dimensions, wiring diagrams and installation details.
3. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

F. Manufacturer's Installation Instructions: Submit for Fire and Combination Smoke and Fire Dampers.

G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 7000 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of access doors, test holes.
- C. Operation and Maintenance Data: Submit for Combination Smoke and Fire Dampers.

1.5 QUALITY ASSURANCE

- A. Dampers tested, rated and labeled in accordance with the latest UL requirements.
- B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.
- C. Perform Work in accordance with NCBC and NCMC.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 - Product Requirements: Product storage and handling requirements.
- B. Protect dampers from damage to operating linkages and blades.
- C. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- D. Storage: Store materials in a dry area indoor, protected from damage.
- E. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 COORDINATION

- A. Section 01 3000 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work where appropriate with building control Work.

1.10 WARRANTY

- A. Section 01 7000 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five (5) year manufacturer warranty for duct accessories.

1.11 EXTRA MATERIALS

- A. Section 01 7000 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two (2) of each size and type of fusible link.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR ALL ACCESSORIES

- A. All accessories shall have a pressure rating equivalent to the duct system in which they are installed.
- B. Material construction shall match system in which accessories are installed.

2.2 BACK-DRAFT DAMPERS

- A. Manufacturers: Subject to compliance with the requirements, manufacturers offering products that may be suitable for use on this project include, but are not limited to, the following or approved equal:
  - 1. Ruskin.
  - 2. Greenheck.
  - 3. Air Balance, Inc.
  - 4. Substitutions: Section 01 6000 - Product Requirements.
- B. Product Description: Multi-Blade, back-draft dampers: Parallel-action, gravity-balanced, Galvanized 16 gage (1.5 mm) thick steel. Blades, maximum 6 inch (150 mm) width, center pivoted, with felt or flexible vinyl sealed edges. Blades linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin. Furnish dampers with adjustment device to permit setting for varying differential static pressure.

2.3 COMBINATION FIRE AND SMOKE DAMPERS (FSD)

- A. Manufacturers: Subject to compliance with the requirements, manufacturers offering products that may be suitable for use on this project include, but are not limited to, the following or approved equal:
  - 1. Ruskin.



2. Greenheck.
  3. Air Balance, Inc.
- B. Fabricate in accordance with NFPA 90A, UL 555, and UL 555S.
- C. Fire Resistance: 1-1/2 hours.
- D. Leakage Rating: Class I, maximum of 8 cfm (3.8 L/s) at 4 inches wg (1 kPa) differential pressure.
- E. Damper Temperature Rating: 350 degrees F (176 degrees C) for smoke control systems.
- F. Frame: 13 gage (1.5 mm), galvanized steel.
- G. Blades:
1. Style: Airfoil-shaped, single piece, double skin.
  2. Action: Opposed.
  3. Orientation: Horizontal.
  4. Material: Minimum 16 gage (1.5 mm) equivalent thickness, galvanized steel.
  5. Width: Maximum 6 inches (150 mm).
- H. Bearings: Stainless steel pressed into frame.
- I. Seals: Silicone blade edge seals and flexible stainless steel jamb seals.
- J. Linkage: Concealed in frame.
- K. Release Device: Close in controlled manner and allow damper to be automatically reset.
- L. Actuator:
1. Type: Electric 120 volt, 60 hertz, two-position, fail close.
  2. Mounting: External.
  3. Each combination fire smoke damper shall be equipped with a UL Classified "Fire Stat" to permit damper to reopen during dynamic smoke control and shall mechanically and electrically close damper upon reaching the damper's maximum degradation test temperature in accordance with UL555S. Damper can be opened via the Fire Alarm System for smoke purge. The damper operation and construction shall meet requirements of UL555S, latest edition.
  4. All wiring material required to interconnect the operator with detection and/or alarm or other systems shall be furnished by this Contractor.
- M. Fall-safe design shall enable damper to automatically assume the desired position when power is interrupted.
- N. Finish: Mill galvanized.
- O. Damper switch package to remotely indicate blade positions.
- P. Factory installed sleeve and mounting angles per local codes. Furnish silicone caulk factory applied to sleeve at damper frame to comply with leakage rating requirements.

- Q. Damper for Out-of-Wall (OW) installations shall have factory-provided integral sleeve with UL required insulation. Sleeve configurations shall meet project requirement.

## 2.4 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Fabrication: Rigid and close fitting of galvanized steel or stainless steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, furnish minimum 1 inch (25 mm) thick insulation with sheet metal cover, minimum 22 gage interior casing.
  - 1. Less than 12 inches (300 mm) square, secure with sash locks.
  - 2. Up to 18 inches (450 mm) Square: Furnish two hinges and two sash locks.
  - 3. Up to 24 x 48 inches (600 x 1200 mm): Three hinges and two compression latches.
  - 4. Larger Sizes: Furnish additional hinge.
  - 5. Access doors located on the bottom of ducts shall have cam fasteners in lieu of hinges in order to avoid interference with ceiling channel supports.
  - 6. Provide access doors upstream and downstream of reheat coils.
  - 7. Provide access door for all dampers including volume dampers, fire dampers, smoke dampers, combination dampers and motorized dampers.
  - 8. Access panels with sheet metal screw fasteners are not acceptable.

## 2.5 DYNAMIC FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555.
- B. Fire Resistance: 1-1/2 hours.
- C. Dynamic Closure Rating: Dampers classified for dynamic closure to 2000 fpm (10 m/s) and 4 inches wg (1 kPa) static pressure.
- D. Construction:
  - 1. Integral Sleeve Frame: Minimum 14 gage (0.9 mm) roll formed galvanized steel. Length: 12 inches (305 mm).
  - 2. Blades:
    - a. Style: Curtain type.
    - b. Action: Spring closure upon fusible link release.
    - c. Material: Minimum 24 gage (0.6 mm) roll formed, galvanized steel.
  - 3. Closure Springs: Type 301 stainless steel, constant force type.
- E. Fusible Link Release Temperature: 212 degrees F (100 degrees C).
- F. Mounting: Vertical or horizontal as indicated on Drawings.
- G. Duct Transition Connection, Damper Style:

1. B style - rectangular connection, blades out of air stream, high free area.
  2. G style - A style connection, grille mounting tabs at end of sleeve for grille.
- H. Finish: Mill galvanized.
- I. Manufactures: Subject to compliance with the requirements, manufacturers offering products that may be suitable for use on this project include, but are not limited to, the following or approved equal:
1. Ruskin
  2. Greenheck
  3. Pottorff
- J. Damper for Out-of-Wall (OW) installations shall have factory-provided integral sleeve with UL required insulation. Sleeve configuration shall meet project requirements.

## 2.6 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch (200 x 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized frame channel with suitable hardware.
- C. End Bearings: Except in round ductwork 12 inches (300 mm) and smaller, furnish end bearings. On multiple blade dampers, furnish oil-impregnated nylon or sintered bronze bearings. Furnish closed end bearings on ducts having pressure classification over 2 inches wg 500 Pa.
- D. Quadrants:
1. Furnish locking, indicating quadrant regulators on single and multi-blade dampers.
  2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.
  3. Where rod lengths exceed 30 inches (750 mm) furnish regulator at both ends.

## 2.7 REMOTE CABLE CONTROL VOLUME DAMPERS

- A. Provide cable control system for all volume dampers located above gypsum board and other inaccessible ceilings.
- B. Bowden cable control kit shall provide all required hardware that shall be mounted onto all rectangular and round volume dampers and provide all interlocking gears and cabling for ceiling mounted control. Coverplate shall be 7/8" diameter cold rolled steel cover with zinc plating for painting by General Contractor. Provide five (5) 12" wrenches for operation.

## 2.8 FLEXIBLE DUCT CONNECTIONS

- A. Provide a suitable flexible connection in both the intake and discharge sides of each fan and air handling unit, where they connect to ductwork.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Connector: Fabric crimped into metal edging strip.
  - 1. Fabric: UL 181 Class 0 listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq yd (1.0 kg/sq m).
  - 2. Net Fabric Width: Minimum 6 inches (150 mm) wide; maximum 10 inches (250 mm) wide.
  - 3. Metal: 3 inch (75 mm) wide and 24 gage (0.6 mm thick) galvanized steel.
- D. High Density Vinyl Sheet: Minimum 0.55 inch (14 mm) thick, 0.87 lbs. per sq ft (4.2 kg/sq m), 10 dB attenuation in 10 to 10,000 Hz range.

## 2.9 DUCT TEST HOLES

- A. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Furnish extended neck fittings to clear insulation.
- B. Provide tapplings in ducts for thermometers where specified. In addition, provide an airtight plugged tapping located as follows:
  - 1. Upstream of each reheat coil.
  - 2. Downstream of each reheat coil.
  - 3. In each supply and return air duct at each floor.

## 2.10 DIAL THERMOMETERS

- A. Thermometer: ASTM E1, stainless steel case, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed lens, stainless steel stem.
  - 1. Size: 3 inch (76 mm).
  - 2. Lens: Clear Lexan.
  - 3. Accuracy: 1 percent.
  - 4. Calibration: Degrees F.

## 2.11 STATIC PRESSURE GAGES

- A. Dial Gages: 3-1/2 inch (89 mm) diameter dial in metal case, diaphragm actuated, black figures on white background, front calibration adjustment, 2 percent of full scale accuracy.
- B. Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch (6 mm) diameter tubing.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Section 01 3000 - Administrative Requirements: Coordination and project conditions.
- B. Verify rated walls are ready for fire damper and fire smoke damper installation. Verify the framed opening size in dry walls.
- C. Verify ducts and equipment installation is ready for accessories.
- D. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

### 3.2 INSTALLATION

- A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Install dampers and accessories where indicated on Drawings.
- C. Access Doors: Install access doors at the following locations and as indicated on Drawings:
  - 1. Spaced every 50 feet (15 m) of straight duct.
  - 2. Upstream of each reheat coil.
  - 3. Before and after each duct mounted filter.
  - 4. Before and after each duct mounted coil.
  - 5. Before and after each duct mounted fan.
  - 6. Before and after each automatic control damper.
  - 7. Before and after each fire damper, smoke damper, combination fire and smoke damper.
  - 8. Downstream of each VAV box.
  - 9. Install at locations for cleaning kitchen exhaust ductwork in accordance with NFPA 96 and NCMC.
- D. Access Door Sizes: Install minimum 8 x 8 inch (200 x 200 mm) size for hand access, 18 x 18 inch (450 x 450 mm) size for shoulder access, and as indicated on Drawings. Install 4 x 4 inch (100 x 100 mm) for balancing dampers only. Review locations prior to fabrication.
- E. Install temporary duct test holes where indicated on Drawings and required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- F. Install fire dampers, combination fire and smoke dampers and smoke dampers at locations as indicated on Drawings and where required. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
  - 1. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92A UL555 and UL555S.
  - 2. Install dampers square and free from racking with blades running horizontally.

3. Do not compress or stretch damper frame into duct or opening.
4. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jack shaft.
5. Install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Install bracing as needed.

### 3.3 INSTALLATION - THERMOMETERS

- A. Install thermometers in air duct systems on flanges.
- B. Locate duct-mounted thermometers minimum 10 feet (3 m) downstream of mixing-dampers, coils, or other devices causing air turbulence.
- C. Install static pressure gages to measure across filters and filter banks, (inlet to outlet). On multiple banks, provide manifold and single gage.
- D. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- E. Install thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- F. Adjust thermometers to final angle, clean windows and lenses, and calibrate to zero.
- G. Install thermometers in the following locations:
  1. Each supply air zone.
  2. Outside air.
  3. Return air.
  4. Mixed air.

### 3.4 DEMONSTRATION

- A. Section 01 7000 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate re-setting of fire dampers and fire smoke dampers to Owner's representative.

### 3.5 STATIC PRESSURE AND FILTER GAGES:

- A. Install filter and static pressure gages in the following locations:
  1. Built up filter banks.
  2. Unitary filter sections.
  3. Supply fan discharge.

## END OF SECTION 23 3300

## **SECTION 23 5701 – RUN-AROUND ENERGY RECOVERY/HEATING SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Run-around energy recovery/heating system.

**B. Related Sections (list below may not include all sections but is intended as a guide):**

1. Section 23 0503 - Pipes and Tubes for HVAC Piping and Equipment: Product and installation requirements for piping materials applying to various system types.
2. Section 23 0523 - General-Duty Valves for HVAC Piping: Product requirements for valves for placement by this section.
3. Section 23 0700 - HVAC Insulation: Product and installation requirements for insulation for valves.

#### **1.2 REFERENCES**

- A. Material and installation shall comply with latest editions of applicable codes, recommended practices and standards of ASME.**

#### **1.3 SUBMITTALS**

- A. Submit shop drawings and product data including the fouling factors, heating surface, input/output data for each heat exchanger, motor sizes and equipment dimensions, and clearances.**

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Konvekta**
- B. Insight Partners**
- C. Hoffman Hydronics**

## 2.2 GENERAL

- A. Provide a Run-Around Energy Recovery System, consisting of heat exchangers for air handling units and exhaust fans, a Hydronic Unit and system controls, having efficiencies as listed in the attached performance schematics and coil schedules.
- B. The heat exchanger fins are of aluminum, 0.4mm thick, with spacing as defined in the coil data sheet, the tubes are of copper and the headers of steel, coated to prohibit corrosion. Heat exchanger sizing and performance are according to attached coil data schedule.
- C. The heat exchangers are cleanable with high pressure water (up to 2600 psi), low-pressure steam, compressed air, hot water and detergent without degrading efficiency.

## 2.3 HYDRONIC MODULE

- A. The Hydraulic Module with the following elements installed/piped/wired and factory tested:
  - 1. One (1) centrifugal pump, one (1) centrifugal redundancy pump incl. shut-off valves, each pump with a variable frequency drive and air separator.
  - 2. One (1) plate-and-frame heat exchanger, one (1) plate-and-frame redundancy heat exchanger.
  - 3. One (1) membrane expansion tank incl. check valves, pressure gauge and pressure relief valve.
  - 4. One (1) glycol makeup tank with duplex pumps
  - 5. Three (3) drain ball-valve.
  - 6. One (1) filing nozzle.
  - 7. One (1) air separator.
  - 8. One (1) bypass valve including drive for anti-freeze protection loop.
  - 9. Four (4) Automatic flow control valves (shipped loose for field installation).
  - 10. Four (4) Balancing valves (shipped loose for field installation).
  - 11. Four (4) Strainers (shipped loose for field installation).
  - 12. Four (4) immersion pockets with PT 100 temperature sensors (shipped loose for field installation).
  - 13. Two (2) Vibration dampers.
  - 14. Two (2) immersion pockets with PT 100 temperature sensors built in.
  - 15. High voltage electrical cabinet and low voltage electrical cabinet with system controller.
  - 16. High performance butterfly isolation valves at pipe connecting flanges.
    - a. Valves in accordance with section 23 0523.
  - 17. Refer to contract drawings for quantities not indicated above.
- B. Delivered without piping insulation. Contractor to insulate all piping in the field.

## 2.4 SYSTEM CONTROLLER

- A. Demand-dependent regulation of the entire energy recovery and heating system (circulation pumps, valves, heat exchangers, plate heat exchangers, etc.), including controller hardware & software, display unit for energy efficiency, temperatures, volumetric flows. Built-in the electrical cabinet, mounted on Hydraulic Module.



- B. Controller functions:
1. Continuous measurement and recording of system operating parameters
  2. Starting/shutting down pumps and regulating flow rate (pump speed) for optimal energy recovery
  3. Minimizing pump power demand (flow rate increase only if additional pump power demand is smaller than marginal energy recovery)
  4. When reaching/exceeding supply air temperature (set-point provided by Building Management System), the energy recovery system is turned down
  5. Freeze protection at exhaust air heat exchangers
- C. In automatic mode, the ERS Controller controls the system operation based on the release from the BMS of the status of the air handling units and the air temperatures. Provide all gateways as required to communicate with base building BMS.
- D. The controller utilizes:
1. The measurement signals (air and Glycol/Water temperatures and volumes)
  2. The ERS pumps
  3. All automatic valves in the glycol/water circuit
- E. The control software is based on a simulation/optimization algorithm with the Supply Air Set Temperatures as set points or command signal, the Glycol/Water temperatures and volumes in the supply air heat exchangers as the actuating variables and the air volumes in the air handlers, the outside air temperature and the exhaust air temperatures as disturbance variables. The simulation algorithm continuously calculates the theoretical system performance (energy recovery efficiency) based on all control variables, the pump and heat exchanger performance curves and different Glycol/Water volumes pumped through the system. The optimization algorithm then sets the actuating variables based on the simulated optimal system performance.
- F. The ERS controller needs the following Input Signals from system components not installed on the Hydronic Module:
1. From BMS:
    - a. Operating mode (heating or cooling operation)
    - b. Supply Air Set Temperatures for each supply air handler
    - c. Air Volumes in each supply and exhaust air handler
    - d. Air Temperature before and after each coil bank (2 data points in each supply air handler, 2 data points in each exhaust air handler)
  2. Other requirements:
    - a. The ERS control cabinet requires one power supply line (460V)
    - b. Internet access to the ERS controller

## 2.5 INSTALLATION

- A. Install heat exchangers (coils) and Hydronic Module in compliance with system manufacturer's installation guidelines. Install piping/insulation between Hydronic Module and coils; install one

electric supply line (460V/3-phase) to Hydronic Module; install piping/insulation of hot water supply to Hydronic Module.

- B. Flush piping and fill system with Glycol / Water mixture as defined in the coil data sheet.
- C. Install sensors in air handling units / exhaust fans and connect either to the energy recovery system's electrical/control cabinet or the BMS and interface control cabinet with BMS. Install internet access to system controller.

## 2.6 SYSTEM START-UP

- A. Remote functional inspection of system controller via internet access approximately two weeks before start-up.
- B. On-site start-up:
  - 1. Review/inspection of heat exchanger and piping installation
  - 2. Review/inspection of sensors and valves installation
  - 3. Inspection/programming of pump frequency converters
  - 4. Functional testing of valves and frequency converters
  - 5. Testing of interface with Building Management System
  - 6. Instruction/training of owner's operating/maintenance staff for a period of 8 working hours at project work site
- C. Start-up takes place in cooperation with HVAC and BMS Contractors.

## 2.7 REMOTE MONITORING, AUTOMATIC REPORTING, OPTIMIZATION

- A. Remote monitoring and optimization of system parameters and performance shall be done by the Manufacturer during the first three years of operation (via internet access into the controller). Many system malfunctions or errors (such as installation or wiring errors, erroneous set values, etc.) can only be detected by monitoring the dynamic system operation. Target values are calculated by means of a system-specific simulation program (built in the system controller), taking into account the measured air temperatures and volumes and the performance curves/maps of heat exchangers, pumps and valves.
- B. Dynamic operations data, static measurements and computed values are made available to the Customer via Internet access. Automatic reporting includes:
  - 1. Calculation and comparison of Target/Actual Energy Recovered in intervals not exceeding 15 seconds and integrating the results to daily, monthly and annual values.
  - 2. Monitoring of important functions and components of the system
  - 3. Display and cause-analysis of malfunctions or deviations from target value

## 2.8 PERFORMANCE GUARANTEE

- A. The equipment supplier shall assume responsibility for the optimal and malfunction-free operation of the energy recovery system during the first year of operation and shall guarantee the system efficiency and/or energy recovery rates at the specified nominal conditions.

- B. Supplier verifies at the end of the first year of operation that the guaranteed values have been achieved (or are not met, respectively):
  - 1. Verification of guaranteed efficiency and/or heat recovery rate
  - 2. Verification of optimal and malfunction-free operation of the entire energy recovery system
  - 3. Verification of total energy saved/recovered, corresponding to calculated target values
  - 4. This verification is in lieu of a performance measurement at the time of start-up.
- C. For an additional annual fee, supplier shall assume responsibility for the optimal and malfunction-free operation of the energy recovery system during year two to five of operation and shall guarantee the system efficiency and/or energy recovery rates at the specified nominal conditions.
- D. As Customer's sole and exclusive remedy under this guarantee, supplier agrees to pay Customer's excess energy cost incurred due to under-performance of the energy recovery system up to a maximum of 25% of the Net Price of the system for the first year of operation and up to a maximum of 35% of the Net Price of the system cumulative for the first five years of operation.

## 2.9 ROUTINE MAINTENANCE

- A. The system controller shall alert the operating staff of pending routine maintenance (e.g., pump routine maintenance).

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Provide equipment where shown, scheduled or specified.
- B. Provide all necessary supports, hangers, flanges, valves, piping and instrumentation for each equipment as shown or as specified.

## END OF SECTION 23 5701



## **SECTION 23 8100 – DECENTRALIZED UNITARY HVAC EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Packaged roof top air conditioning units.

#### **1.2 SUBMITTALS**

**A. Shop Drawings: Required**

**B. Product Data: Required.**

**C. Manufacturer's Installation Instruction: Required.**

**D. Provide dimensional drawings and product data on each high-plume laboratory exhaust fan assembly.**

**E. Provide fan curves for each fan at the specified operation point, with the flow, static pressure and horsepower clearly plotted.**

**F. Provide nozzle velocity of exhaust fan, total exhaust flow, and discharge plume height at specified wind velocity.**

**G. Strictly adhere to QUALITY ASSURANCE requirements, as stated in section 1.4 of this specification.**

**H. Submit shop drawings and product data in accordance with Division 1.**

**I. Submittals shall include the following:**

1. Dimensioned plan and elevation view drawings and location of all field duct connections and openings.
2. Manufacturer's performance of each unit. Performance sheets shall include, as a minimum, the following:
  - a. Input data used for selection
  - b. Unit model number
  - c. Energy recovery performances
  - d. Cooling performances
  - e. Heating performances
  - f. Fan curves
  - g. Unit electrical data (voltage, FLA, MCA, MOP)
  - h. Approximate unit shipping weight

3. Unit Manufacturer shall provide certified ratings conforming to the latest edition of AMCA 210, 310, 500 and AHRI 410.
4. Unit construction and component summary.
5. Unit sequence of operation, including flow schematic, list of contacts and signals and control accessories.

### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Required.

### 1.4 QUALITY ASSURANCE

- A. Packaged Roof Top Air Conditioning Units:
  1. Cooling Capacity: Rate in accordance with ARI 340/360.
  2. Sound Rating: Measure in accordance with ARI 270.
  3. Performance Requirements: Conform to minimum EER/SEER prescribed by ASHRAE 90.1 when tested in accordance with ARI 340/360.
- B. Air Handling Unit Manufacturer shall have a minimum of 25 years experience in the energy recovery market.
- C. Energy recovery units shall be capable of transferring sensible, latent or total energy as listed in the equipment schedule. Energy transfer device shall be certified to AHRI Standard 1060 and bear the AHRI seal.
- D. Units shall carry the label of a Nationally Recognized Testing Laboratory (NRTL) or a Standards Council of Canada (SCC) approved lab (Testing Organization and Certifying Body).
- E. Units shall be constructed in accordance with CSA C22.2 and UL 60335-2-40 Harmonized Standard and shall carry the ETLus and ETLc label of approval. ETL or UL listing of individual components or control panels only is not acceptable.
- F. Units shall be constructed to provide smooth interior surfaces.
- G. Units shall comply with NFPA 70, National Electrical Code, as applicable for installation and electrical connections of ancillary electrical components of Air Handling Units.
- H. Unit internal insulation must have a flame spread rating not over 25 and smoke developed rating no higher than 50 complying with NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.
- I. Units shall deliver the specified volume of air at the scheduled static pressure.
- J. Airflow data shall comply with AMCA 210 method of testing.
- K. All electrical components and assemblies shall comply with NEMA standards.
- L. If Manufacturer cannot provide any of the items or options listed within this specification it must be noted as an exception on the bid.

1.5 WARRANTY

- A. Furnish five-year manufacturer warranty for refrigeration compressors & heat exchangers.

1.6 MAINTENANCE SERVICE – PROVIDE UNDER ADD ALTERNATE

- A. Furnish service and maintenance of equipment for one year from Date of Final Acceptance. Include maintenance items as shown in manufacturer's operating and maintenance data, including filter replacements, fan belt replacement, and controls checkout and adjustments.

PART 2 - PRODUCTS

2.1 PACKAGED ROOF TOP AIR CONDITIONING UNITS

- A. Manufacturers: Subject to compliance with the requirements, manufacturers offering products that may be suitable for use on this project include, but are not limited to, the following or approved equal:
  - 1. Venmar
  - 2. Mammoth
  - 3. Huntair
- B. Product Description: Self-contained, packaged, factory assembled and wired unit, consisting of roof curb; cabinet, casing, and frame; discharge plenum section; supply fan section; inlet guide vanes; variable frequency drive; cooling coil section; compressor; condensing section; refrigerant circuit; gas or electric heating section; filter section; outdoor and return air section; exhaust and relief air section; electrical; controls; and accessories.
- C. General
  - 1. Furnish and install where shown on the plans, Air Handling Units with design features as specified within this specification. The units shall be provided and installed in strict accordance with the specifications. All units shall be complete with all components and accessories as specified. Any exceptions must be clearly defined. The Contractor shall be responsible for any additional expenses that may occur due to any exception made.
  - 2. The units shall be installed and oriented such that the outside fresh air intake hood is positioned in a direction opposite to prevailing winds.
- D. Factory Testing and Quality Control
  - 1. Standard Factory Tests
    - a. Units shall be factory run tested to ensure proper functioning of components. Fans shall be factory run tested to ensure structural integrity and proper rpm and shall be statically and dynamically balanced for continuous operation at the maximum rated fan speed and motor horsepower in accordance with AMCA 204. All electrical circuits shall be tested to ensure correct operation before shipment of unit. Units shall pass quality control and be thoroughly cleaned prior to shipment.

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- b. Air Handling Unit Manufacturer shall have a minimum of 25 years experience in the energy recovery market.
- c. Energy recovery units shall be capable of transferring sensible, latent or total energy as listed in the equipment schedule. Energy transfer device shall be certified to AHRI Standard 1060 and bear the AHRI seal.
- d. Units shall carry the label of a Nationally Recognized Testing Laboratory (NRTL) or a Standards Council of Canada (SCC) approved lab (Testing Organization and Certifying Body).
- e. Units shall be constructed in accordance with CSA C22.2 and UL 60335-2-40 Harmonized Standard and shall carry the ETLus and ETLc label of approval. ETL or UL listing of individual components or control panels only is not acceptable.
- f. Units shall be constructed to provide smooth interior surfaces.
- g. Units shall comply with NFPA 70, National Electrical Code, as applicable for installation and electrical connections of ancillary electrical components of Air Handling Units.
- h. Unit internal insulation must have a flame spread rating not over 25 and smoke developed rating no higher than 50 complying with NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.
- i. Units shall deliver the specified volume of air at the scheduled static pressure.
- j. Airflow data shall comply with AMCA 210 method of testing.
- k. All electrical components and assemblies shall comply with NEMA standards.
- l. If Manufacturer cannot provide any of the items or options listed within this specification it must be noted as an exception on the bid.

E. Unit Construction Description

- 1. Provide factory fabricated Air Handling Units with capacity as indicated on the schedule. The units consist of factory assembled components as shown on drawings, including but not limited to fan and motor assemblies, all necessary dampers, hoods (outdoor units only), plenums, filters, drain pans, wiring, controls and other accessories as outlined in the schedule, enclosed in a single or multiple piece casing as shown on the mechanical drawings. Units shall be stand alone controlled, except where noted, with all control devices provided and wired for single-point power connection by the Manufacturer unless otherwise outlined in the schedule. Units shall have overall dimensions as indicated and fit into the space available with adequate clearance for service as determined by the Engineer. Tags and decals to aid in service or indicate caution areas shall be provided. Electrical wiring diagrams and Installation, Operation and Maintenance Instructions Manual shall be attached to the control panel access doors within each unit. Units shall be UL or ETL listed. Units shall be shipped in one piece or shall be split for shipment to accommodate freight as required, as shown on mechanical drawings.
- 2. Unit perimeter base shall be completely welded and constructed from (6" [152 mm]) structural tubing and shall accommodate curb or concrete pad installation as shown on drawings (Note: bolted or riveted bases are not acceptable). Unit base floor shall be constructed from four-break formed steel panels, made from 14 gauge hot rolled steel (HRS). Floor panels shall be welded to each other, creating I-beams at each floor panel junction. Floor panel junctions shall be located at 14" increments (maximum) or less, in order to provide floor rigidity and support as required for internal components. Unit floor panels shall be welded to perimeter base frame steel tubing. Unit floor shall be insulated from underneath with 3" [76.2 mm], R20 polyurethane closed cell spray foam and protected with 24 gauge galvanized steel liners. Unit floor construction shall include two-stage thermal break, using gasket between base floor framing and liners underneath and floor membrane on top. Unit base and floor shall be factory covered with top coat



industrial grade membrane to ensure air- and water-tightness as well as walk-on grip. Floor membrane shall be high performance, sprayed, plural-component pure polyurea elastomer, based on amine-terminated polyether resins, amine chain extenders and prepolymers. Floor membrane shall be flexible, tough, resilient monolithic membrane with good water and chemical resistance and shall resist to temperatures up to 250°F. Floor membrane materials shall be free of solvents and VOC's, shall be suitable for use in compartments handling conditioned air and shall comply with the requirements for the Standard for Heating and Cooling Equipment, ANSI/UL 60335-2-40, fourth edition, dated 12/15/2022, Clause 30.1 and Clause 30.2. Single wall floor construction with glued and pinned insulation and no subfloor is not acceptable; non-insulated floor construction is not acceptable. Floor constructions which are not air- and water-tight are not acceptable. Entire base frame is to be painted with a phenolic coating for long term corrosion resistance. Base frame shall be attached to the unit casing frame at the factory. When rigging, base frame deflection shall be less than 1/360 of the unit length. All major components shall be supported by the base without sagging or pulsating.

3. Floor openings shall be covered with painted walk-on steel safety grating. Steel safety grating shall consist of 1" x 1/8" [25 x 3 mm] bearing bars, forged welded with 3/16" [5 mm] twisted cross bars, providing a non-slip surface for extra safety, with opening size not greater than 1-3/16" x 4" [30 x 102 mm].

F. Rigging Provision – Multiple Piece Units

1. Units shipped in multiple sections shall be engineered for field assembly. The unit section base frame shall include lifting lugs located at the corner of the unit (and along the sides as required by design) and sized to allow rigging and handling of the units. Rigging shall be performed using all lifting lugs at all times and in strict accordance with the instructions provided within the Installation, Operation and Maintenance Instructions Manual. Peripheral lifting lugs may be removed after rigging; however, bolts shall be set back in place after lug removal. Lifting lugs located along a section side corresponding to a unit section split shall be removed without bolts being set back in place afterwards. Units shall be provided with all necessary gaskets, caulking, hardware and instruction for assembly on site by Installing Contractor. Compression points shall be provided at the base frame, along the sides at 18" increments and at the top for aligning and joining section splits.

G. Unit Casing

1. Unit wall and roof rigid frame shall consist of 16 gauge pre-painted galvanized formed steel corner posts and 16 gauge G90 galvanized formed steel (1" x 2" [25 x 51 mm]) intermediate frame posts, providing stable construction allowing for removal of any panel without affecting unit structural integrity. Units without framed type of construction are not acceptable. Exterior casing panels shall be attached to the gasketed (1" x 2" [25 x 51 mm]) steel frame with corrosion resistant fasteners. Air Handling Unit casing shall be of the no-through-metal design. Casing shall incorporate insulating thermal breaks as required so that, when fully assembled, there is no path of continuous unbroken metal to metal conduction from inner to outer surfaces. Provide necessary support to limit casing deflection to L/200 of the narrowest panel dimension. If panels cannot meet this deflection, additional internal reinforcing is required. Units shall be designed for outdoor or indoor installation as indicated on the schedule. Indoor units weatherized for outdoor use are not acceptable. Outdoor units shall have a double sloped roof with 3% minimum roof pitch to prevent water accumulation, rain gutters above all access doors and roof joint seams of the T-shape construction, with minimum height of 1" [25 mm], metal strip sealed and encapsulated. Outdoor units shall be designed to resist snow, ice and wind

loads, and if provided with weather hood(s), equipped with birdscreen and rain gutters. Indoor units shall have a flat roof. Hoods shall be shipped loose for field assembly. Internal partition on dual air tunnel units shall be insulated and constructed in the same manner and thickness as the unit cabinet outer liners. All panel seams shall be caulked and sealed for an air-tight unit.

- H. Outside skin shall be made of pre-painted steel unless otherwise specified. Exterior paint finish shall withstand 1,000 hours of salt spray as per ASTM B-117.

- I. Options:

- 1. Corrosion resistant exterior paint finish shall withstand 2,500 hours of salt spray as per ASTM B-117.

- J. Double Wall Construction

- 1. Units shall entirely be made of double wall construction. Single wall construction with coated insulation is not acceptable. Exposed insulation edges in the airstream are not acceptable. Unit panels shall be made of 18 gauge galvanized steel outer liners and 24 gauge galvanized steel inner liners.

- K. Insulation

- 1. Unit wall and roof panels shall be insulated with 3" [76 mm] thick, R12.5, 1.5 lb./cu. ft. non-compressed fiberglass insulation. Unit internal partition (dual air tunnel units) shall be insulated with 2" [51 mm] thick, R8.3, 1.5 lb./cu. ft. non-compressed fiberglass insulation. Insulation shall meet the erosion requirements of UL 181 facing the airstream and fire hazard classification of 25/50 (per ASTM-84 and UL 723 and CAN/ULC S102-M88). All insulation edges shall be encapsulated within the panels. All perforated sections shall have insulation with black acrylic coating.

- L. Access Doors

- 1. Full size access door(s) allowing for periodic maintenance and inspections shall be provided for all serviceable components as shown on the plans. Removable panels are not acceptable. Doors shall be solid double wall insulated construction. Insulation shall be the same as unit panels. Both the inner and outer liners shall be made of the same material as unit cabinet outer liner construction. The door hinge assembly shall be die cast zinc with stainless steel pivot mechanism, completely adjustable. Hinges shall allow doors to open at 180° with no shear effect on the hinge side of the perimeter gasket. The door frame shall be extruded aluminum with a built-in thermal break barrier and full perimeter gasket. The door gasketing shall employ a double seal comprising of an adhesive neoprene compressible foam gasket on the outer door panel and an "automotive style" neoprene bulb gasket fixed onto the inner door frame for out-swing doors, "rippled" foam for in-swing doors. There shall be a minimum of two heavy duty cast, UV rated, nylon handles per door. Door handles shall be operable from both inside and outside of the unit. On all access doors where moving parts could cause injury, an ETL, UL 60335-2-40 and OSHA approved tool operated safety latch shall be provided.
  - 2. Note: If Manufacturer cannot provide thermal break door design it must be noted as an exception on the bid.

- M. Condensate/Drain Pans

1. IAQ style drain pans shall be provided as shown on the drawings. Drain pans shall be fabricated from 18 gauge 304 stainless steel, except under coils, where drain pans shall be fabricated from 14 gauge 304 stainless steel. All drain connections shall be piped and trapped (in field, by others) separately for proper drainage. Drain pans shall be sloped at a minimum of 1.5% with a threaded drain pipe connection ending through the side of structural base frame. Drain pipe shall be schedule 40, 1¼" [32 mm] nominal, MPT stainless steel pipe. All drain pan corners shall be welded.

N. Unit Component Description

1. The FANWALL® array shall consist of multiple, direct driven, arrangement 4 plenum fans spaced in the airway tunnel cross section to provide a uniform airflow and velocity profile across the entire airway tunnel cross section and components contained therein. The FANWALL array shall be constructed per AMCA requirements for the duty specified, (Class I, II, or III). All fans shall be selected to deliver design airflow at the specified operating TSP at the specified motor speed and as scheduled. The FANWALL array shall be selected to operate at a system Total Static Pressure that does not exceed 95% of the specified fan's peak static pressure producing capability at the specified fan speed.
2. Fan array shall consist of multiple fan and motor "cubes", spaced in the airway tunnel cross section to provide a uniform airflow and velocity profile across the entire airway tunnel cross section and components contained therein. Each fan/motor assembly shall be removable through a 30" [762 mm] wide open area. Access door located on the discharge/inlet side of the FANWALL® array.
3. Wire sizing shall be determined and installed in accordance with applicable NEC, UL 60335-2-40 and Canadian Electrical Code (CEC) standards. Each fan cube shall be individually wired to a control panel containing a single VFD, as specified elsewhere, for the total connected horsepower for all fan motors contained in the FANWALL array.
4. The FANWALL array shall be provided with a Coplanar Silencer for sound absorption. The Coplanar Silencer will reduce the bare fan discharge sound power levels as noted below and/or in the plans. Unless otherwise specified, the acoustical silencers shall reduce the bare fan discharge sound power levels by a minimum of 15 dB, re 10<sup>-12</sup> watts with center frequencies of 125, 250, 500, 1,000, 2,000, 4,000 and 8,000 Hz when compared to the same unit design without the silencers.
5. Motors shall be standard foot mounted type, TEFC or TEAO motors selected at the specified operating voltage, RPM, and efficiency as specified or as scheduled elsewhere. The motor shall incorporate hybrid ceramic bearings on both bearings to prevent electrical arcing across bearing races and balls. Fiber type grounding devices are not permitted.
6. Provide NEMA Premium Efficiency induction motors that meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2. Motors shall be available in ½ HP increments as nameplate HP ratings from 1 HP through 15 HP. Motors shall be manufactured by Toshiba or Baldor.
7. Each fan/motor assembly shall be dynamically balanced to meet AMCA standard 204-96, for fan application class BV-5, to meet or exceed a rotational imbalance Grade 0.55, producing a maximum rotational imbalance of 0.022" per second peak, filter in [0.55 mm per second peak, filter in]. 'Filter in' measurement indicates that the specified balance grade must be achieved at the submitted design operating speed for the fan(s).
8. The discharge and inlet bare fan sound power levels for each individual octave band shall not exceed the values specified or scheduled for the FANWALL array. Alternate Manufacturers must submit acoustical data for review and approval prior to the bid indicating that the proposed alternate equipment can meet all specified performance requirements without impacting the equipment performance or design features including duct connection location, unit weights, acoustical performance or specified total fan

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- horsepower for each FWT array. Proposals submitted which indicate a higher connected fan horsepower and higher sound power levels than specified or scheduled will not be accepted.
9. The sound power levels for each individual octave band shall not exceed the values specified or scheduled for each individual inlet and discharge opening from the air handling unit(s).
  10. Each fan motor shall be individually wired to a control panel containing variable frequency drive(s) or starter(s), as specified elsewhere. Wire sizing shall be determined and installed in accordance with applicable NEC, UL 60335-2-40 and CEC standards.
  11. Notes: If alternate direct driven or belt driven fan systems are proposed by the Contractor, it shall be the responsibility of the Contractor proposing the alternate fan system(s) to guarantee that the sound (Noise Criteria) levels in the occupied space will not exceed those per the basis of design FWT system. Any acoustical treatment for alternate fan system(s) must be approved by the Engineer and Architect prior to installation, and any such acoustical treatment, or subsequent treatment, will be done at the sole expense of the Contractor proposing the alternate fan system(s).
  12. Manufacturers of alternate fan/motor assemblies, provided in lieu of the specified FANWALL array(s), shall provide a spare motor and fan assembly for each type and size of fan/motor assembly, as well as a five year parts and labor warranty for replacement at no additional expense to the Owner. Such warranty coverage shall include the cost of any cranes or lifting devices, unit disassembly and reassembly, fan balancing, etc., as required.
  13. FANWALL array(s) shall be provided with the following options:
    - a. Each fan applied in multiple fan applications shall be provided with an integral backflow prevention device that prohibits recirculation of air in the event a fan, or multiple fans, become disabled. The system effect for the submitted backflow prevention device shall be included in the calculation to determine the fan TSP for fan selection purposes and shall be indicated as a separate line item SP loss in the submitted fan selection data. Manufacturers other than the basis of design being submitted must provide independent lab certification of fan testing that indicates the system effects attributed to the submitted backflow prevention device in the submitted close coupled mounting arrangement at the inlet of the fan. Fans submitted with discharge dampers will not be approved.
    - b. Backdraft damper performance data that is based on an AMCA ducted inlet and ducted discharge mounting configuration will not be accepted. Submitted backflow prevention device data must be reflective of close coupled mounting at the intake of the fans(s) per the project design documents. Motorized dampers or other motorized devices submitted for backflow prevention are not acceptable.

O. FANWALL TECHNOLOGY Electrical

1. Provide a complete electrical system required to run the FANWALL® array system including all equipment, material, electrical enclosure and electrical components. FANWALL array designs shall be in accordance with specific system requirements. Please see system requirements before electrical design of FANWALL system is to commence. FANWALL array electrical designs shall be in accordance with the NEC, CEC, UL 60335-2-40.
  - a. Motor Current Protection All motors in the FANWALL array shall be provided with individual motor protection for thermal overload protection. All motor circuit protectors shall be located in main enclosure.

2. If required by design, all motor circuit protectors shall be mounted and located in a remote motor circuit protector panel as needed that is separate from the main enclosure. Motor circuit protector enclosure must be located and mounted at a minimal distance from motors in the FANWALL array.
3. FANWALL TECHNOLOGY with Variable Frequency Drive Control as required by system design, provide a single variable frequency drive to start and run all motors in the FANWALL array. The variable frequency drive shall be sized accordingly to start and hold all motors in the FANWALL. Provide short circuit protection for the drive through means of using fuses with fuse blocks or circuit breakers.
4. The variable frequency drive shall be mounted in a dedicated enclosure for connection to single-point power. Variable frequency drive enclosure shall be provided with a main disconnecting means. Provide appropriate cooling of enclosure.
5. Motor circuit protectors shall be used for each motor in the FANWALL® array. Motor circuit protectors shall be housed and mounted in the VFD enclosure as required. Motor circuit protectors may be mounted in a remote enclosure that is separate from VFD enclosure if design requires. Variable frequency drive enclosure and remote motor circuit protector enclosure must be mounted at a minimal distance from fan array motors and each other.
6. Provide three-phase power distribution wiring and control wiring as required. All three-phase power components shall have a rating listed for short circuit current rating (SCCR). Provide control wiring and components required for complete operation of FANWALL system. System controls, controls components and control wiring shall include, but is not limited to, auto mode or manual mode, cfm control mode or BMS control mode. Controls and control wiring shall include auto start/stop, manual start/stop, life safety/smoke shutdown, system alarms and VFD alarms. All control wiring shall be included in VFD enclosure provided with system.

P. Coils – General Information (Applicable to Steam, Hydronic and Direct Expansion Coils)

- Q. Coils shall be submerged in water and tested to a minimum dry air/nitrogen pressure of 300 psig standard copper tube coils. Coils shall display a tag with the Inspector's identification as proof of testing. Tubing, return bends and headers shall be made of seamless UNS 12200 copper meeting ASTM B75 and ASTM B251 Standards. Coil return headers shall be equipped with factory installed 1.2" FPT air vent connections placed at the highest point available on the face of the header (except for evaporator coils). Casings and endplates shall be made of 16 gauge galvanized steel, meeting ASTM A527 Standard unless otherwise noted. Double flanged casings on the top and bottom of finned height shall be provided to allow for coil stacking. Piping, control valve and valve operator shall be supplied and installed by others.

R. Direct Expansion Coils

1. Coils shall be tested to be leak-free with nitrogen or dry (at least 300 psig) air underwater. Standard construction connections shall be sweat-soldered and constructed of copper. Distributor shall be designed to have a removable nozzle to allow for installing an auxiliary side connection for hot gas bypass. Provide intermediate drain pans on all stacked cooling coils. The intermediate pan shall drain to the main drain pan through a copper downspout.
2. Coil construction (standard 1/2" o.d. tubes):
3. 1/2" o.d. x .017" wall copper tube
4. 0.006" aluminum fins (available on 1/2" coil only)
5. 16 gauge galvanized steel casing

- S. Refrigerant Circuits – General Information (Applicable to Integrated Air Cooled Condensing Section, Water Cooled Condensing Section, Integrated Water Source Heat Pump and Integrated Air Source Heat Pump)
- T. Entire unit, including all refrigeration circuits, shall be manufactured as one single system, at the same time and location, by the unit Manufacturer. Systems where the unit Manufacturer is purchasing a condensing unit from another Manufacturer and integrating it to the unit, are not acceptable. Refrigeration section shall be designed for full and easy access for maintenance. Entire refrigerant piping circuit shall be leak tested at 450 psig (R454B refrigerant) or 200 psig air pressure (R513a refrigerant). Capacity modulation shall be provided by modulation capacity compressor and/or by hot gas bypass on lead compressor(s).
- U. Refrigerant circuit components shall include: thermal expansion valve; distributor; liquid line filter drier; charging valve and high and low pressure side gauge ports. Refrigerant circuits shall also include:
- V. All refrigerant piping shall be of K, L or ACR copper type. The complete system shall be factory dehydrated and pressure tested at 450 psig (for R454B refrigerant) or 200 psig air pressure (for R513a); the system shall then be factory charged.
- W. Suction lines shall be insulated with 3/8" [10 mm] thick elastomeric pipe insulation. Pipe insulation exposed to UV light radiation shall be protected with aluminum tape. Safety controls shall include a high and low refrigerant pressure switch on each circuit for protection against loss of charge. Each refrigerant circuit shall include DDC controlled compressor anti-cycling. Each refrigerant line present in other compartments than only the compressor compartment shall be clearly identified with the use of labels showing both the refrigerant line's duty (suction, liquid, discharge, hot gas bypass, hot gas re-heat) along with the circuit number (i.e. Suction 1, Liquid 3, etc.). This labeling shall be repeated in each compartment of the unit (else than the compressor compartment) where refrigerant lines are present, in such a way that all refrigerant lines in any other compartment can easily be identified. Unit water inlet and water outlet lines shall be clearly identified with the use of labels showing "water inlet" and "water outlet" near the point of connection to the building's water network. Units shall be provided with R454B refrigerant for scroll compressors or R513a refrigerant for screw compressors. Equipment utilizing R454B refrigerant shall be equipped with either a Refrigerant Leak Detection system or a constant air flow circulation system in conformance with UL 60335-2-40 Annex GG.
- X. Integrated Air Cooled Condensing Section
  - 1. Each refrigerant circuit shall include moisture indicating site glass, filter drier, liquid line isolation valve and externally equalized thermostatic expansion valve. Safety controls shall be manual reset on both low pressure and high pressure sides. The complete refrigerant piping shall be factory tested.
  - 2. Condenser coils shall be tested to be leak-free with nitrogen or helium at 500 psig underwater in an illuminated tank. After testing, coils shall be evacuated, thoroughly dried and capped. Coils shall be constructed of high performance aluminum microchannel tubes, fins and manifolds. Tubes shall be flat and contain multiple, parallel flow microchannels and span between aluminum headers. Full depth louvered aluminum fins shall fill spaces between the tubes. Tubes, fins and aluminum headers shall be oven brazed to form a complete refrigerant-to-air heat exchanger coil. Copper stub pipes shall be electric resistance welded to aluminum coils and protected to seal joints from corrosive environmental elements. A 10°F [5.5°C] sub-cooling section shall be an integral part of the condenser coil. Standard construction fluid connections are sweat-soldered and made of copper.

3. Air-source heat pump shall include an optimized start defrost cycle to prevent frost accumulation on the outdoor coil during heat pump heating operation and to minimized defrost cycle energy usage. If the temperature of the outdoor heat exchanger and/or the suction line is less than a predetermined value, a deferred defrost cycle is initiated wherein the defrost cycle starts after a variable, continuously optimizing, time interval has elapsed. The defrost cycle is terminated when the relative temperatures of the outdoor heat exchanger and/or the suction line indicate that sufficient frost is melted from the heat exchanger to insure adequate time between successive defrost cycles for optimizing the efficiency and reliability of the system, or after a predetermined time interval has elapsed, whichever condition occurs first. During defrost cycle all compressors shall energize, reversing valves shall de-energize, and auxiliary heat shall energize.

Y. Scroll Compressors

1. Compressor shall be hermetically sealed scroll type with a forced-feed lubrication system and oil charge. Compressor motor shall be suction-cooled motor windings with inherent internal line break protection and mounted on RIS vibration isolators. Compressor shall include internal pressure relief valve, gas sensor and device to limit the shut-down noise caused by scroll reversal. Each compressor shall have a crank case heater that is independently fused and will remain energized at all times unless unit is disconnected at the main power source.
2. Option: Lead compressor shall be capable of seamless capacity modulation from 10% to 100% of its nominal capacity, without the use of hot gas bypass. Lead compressor shall be designed to be able to operate free of oil return problems, when installed with length of interconnecting pipe up to 300 ft. and vertical elevation up to 90 ft. Oil shall return to the compressor without the use of oil separator or oil return cycle.

Z. Filters

1. Provide filters of the type indicated on the schedule. Factory fabricated filter sections shall be of the same construction and finish as the unit. Outside and return air inlets shall be equipped with galvanized steel racks that permit filter slide out removal (side access) for air tunnels equal or less than 72" [1,829 mm] tall and universal holding frames with upstream access (face loading) for air tunnels taller than 72" [1,829 mm]. Face loaded pre and final filters shall have Type 8 frames as manufactured by AAF, FARR or equal. Side service filter sections shall include hinged access doors. Internal blank-offs shall be provided by the air unit Manufacturer as required to prevent air bypass around the filters. The filters shall be as manufactured by Farr, Purolator, AAF or equal. Filters shall be in compliance with ANSI/UL 900: *Test Performance of Air Filters*. Filter air velocity shall not exceed 500 fpm through each filter bank. Units shall be equipped, to a minimum, with 2" thick, 35% efficient (MERV 8) medium efficiency pleated filters.

AA. Dampers

1. Unit shall be equipped with all necessary dampers required for the system as shown on the mechanical drawings. Dampers shall be designed for operating temperatures between -40°F [-40°C] and 212°F [100°C]. Air leakage through a 48" x 48" [1,219 x 1,219 mm] damper shall not exceed 10.3 cfm/sq. ft. against 4" w.g. differential static pressure at standard air condition. Standard air leakage data to be rated in accordance with AMCA certified rating program. Outside air dampers shall be opposed blade motorized and exhaust air dampers shall be of parallel blade gravity backdraft type. For other dampers, see Manufacturer's recommendations. Damper actuators drive voltage

- shall be with 24 VAC for 2 position or 0–10V for modulation. Flat or formed metal blades are not acceptable.
2. Damper construction shall be as follows: damper frame shall be of extruded aluminum or galvanized steel; damper blades shall be of extruded aluminum; dampers shall be of opposed blade type or parallel blades where indicated; damper blade ends shall be sealed with neoprene edge seals with bottom and top blade wiper seals. Unit shall be provided with the following damper(s):
    - a. Outside air damper
    - b. Exhaust air damper (motorized, spring return)
    - c. Recirculation damper

**BB. Airflow Monitoring Station & O/A Damper**

1. The TAMCO & EBTRON package damper combo combines EBTRON's high-performance airflow measurement technology with the TAMCO heavy-duty damper, providing unprecedented flexibility in airflow control.
2. Rain Hoods
  - a. Rain hoods shall be fabricated from same material as unit casing with ¼" wire mesh inlet screen. Hoods sized to minimize moisture carry over.

**CC. Electrical Power and Controls**

1. All wiring and electrical connections shall be of copper wires, copper bus bars and copper fittings throughout. Power supply terminals shall be identified with permanent markers.
2. All high voltage wiring conduit shall consist of flexible metal conduit. All low voltage and signal wiring shall consist of Belden cable.
3. When unit section splits are present, low voltage wiring shall be split using quick connectors for quick and easy field installation. Additionally, for each set of quick connector, the male branch in one unit section and the corresponding female branch in the next unit section shall be identified with the use of a color coded or numbered label. At each high voltage line split, a junction box shall be provided in one of the sections; the wiring in the section where the junction box is located and the matching wiring in the next section shall be identified with the use of a color coded or numbered label.
4. The unit shall feature a mounted permanent nameplate displaying, at a minimum, the Manufacturer, serial number, model number, date of manufacture and current and voltage readings. The unit must have an ETL or UL Listing and bear the appropriate mark.
5. An integral electrical control compartment shall be furnished on the unit. The compartment shall be constructed to NEMA 3R requirements for outdoor units or NEMA 1 requirements for indoor units, provided with a hinged access door and a locking device. All components, except those not mounted directly in the unit, shall be factory mounted and wired to a labeled terminal strip. All components shall be identified using printed self-adhesive labels, consistent with the numbering used in the wiring diagrams. Control components shall include, but are not limited to, single-point connection power distribution block, sub and control circuit fuses or circuit breakers, control transformers, motor starters and overloads for single-speed operation. The control system shall be factory mounted in the control compartment and shall be a stand alone microprocessor-based Direct Digital Control system, with necessary sensors and interfaces to monitor and operate all functions as outlined in the equipment/control schedule, flow schematic, sequence or required for complete unit operation. A unit mounted intelligent programmable interface device shall be included for communication, display and setpoint



control. Control panel compartment heaters and thermostats or cooling fans with grilles or registers shall be provided if control panel components cannot be protected from their minimum or maximum ambient temperature ratings. For automatic unit start-up an external dry contact must be provided by others (ex: building management system (BMS), BACnet, time clock, etc.). The DDC controller shall be factory programmed and factory run tested prior to shipment to verify functions and logic.

6. A flow schematic with sensor and component identification and location, interlocks and sequence of operation shall be included with submittals.
7. A wiring schematic and a bill of materials shall be completed in ladder/logic format, with component labeling according to line numbers, once a release for production has been received. The wiring schematic, bill of materials and flow schematic shall be included within the units control compartment.

**DD. Control Systems**

1. Units shall be provided with temperature controls. Room sensors shall be mounted and wired by the Electrical Contractor. Steam, hot water or chilled water valves shall be installed by the Contractor as shown on the plans and wired by the Electrical Contractor. The control system shall include all safety and operating controls required to meet the equipment's ETL or UL listing and the requirements of UL 60335-2-40. Controls to include branch and sub-circuit fusing, contactors, relays and pressure controls. Panel to be constructed to NEMA 3R requirements for outdoor units or NEMA 1 requirements for indoor units and will have hinged access panels.
2. The unit shall be provided with a Direct Digital Control system, including provisions for remote start/stop and setpoint reset. Local display of all setpoints and other user adjustable parameters will be provided. All safety controls shall be manual reset.
3. Each unit shall be furnished complete with all operational controls. All controls shall be factory installed and wired except for room sensors which shall be field installed by the Temperature Control Subcontractor. The control system shall be a DDC control system consisting of space control and economizer control.
4. Airflow Control – Supply Fan
5. Variable Air Volume (VAV)
  - a. The supply fan speed will be controlled to maintain a duct static setpoint by using a duct static pressure transducer. The static pressure probe is field mounted 2/3 down the longest duct trunk.

**EE. Economizer (AiSE, Airside Economizer)**

1. In economizer operation, the outside air and return air dampers shall operate to maintain the supply control setpoint. If economizer operation cannot provide enough cooling, the mechanical cooling will be energized. During heating operation, the outside air damper will be at the minimum control position setpoint.

**FF. Economizer (Energy/Heat Recovery Economizer) Supply Temperature Control**

1. In economizer operation, the energy/heat recovery device will operate to maintain the supply control setpoint. If the economizer operation cannot provide enough cooling or heating, mechanical cooling or heating will be energized.

**GG. Configuration:**

1. Air delivery: Downflow.

2. Draw through.
- HH. Roof Curb: Factory assembled Minimum of 16 inches (400 mm) high.
- II. Supply Fan Modulation: Inlet guide vanes or Variable Frequency Drive for supply fan.
- JJ. Cooling Coil Section: Coil constructed of seamless copper tubes mechanically expanded into aluminum fins and drain pan. Furnish coil with corrosion resistant coating capable of withstanding salt spray test of 1000 hours in accordance with ASTM B117.
- KK. Compressors: Semi-hermetic type. Furnish with each compressor with independent refrigeration circuit, internal vibration isolators, short cycle protection.
- LL. Condensing Section: Condenser coil constructed of copper tubing mechanically bonded to copper fins. Condenser fans with high efficiency fan motors. Furnish factory installed coil guard.
- MM. Refrigeration Circuit: Furnish the following for each circuit: thermal expansion device, core filter drier], suction, discharge, and liquid line service valves with gauge ports, high and low pressure safety controls, liquid line solenoid valve, sub-cooler circuit to provide 15 degrees of liquid sub-cooling.
1. Hot gas reheat.
  2. Furnish control to provide low ambient cooling to 0 degrees F (-18 degrees C).
- NN. Electric Heating Coil Section:
1. Staged elements, constructed with low watt density high nickel-chromium alloy resistance wire.
  2. Location: Downstream of fan section.
- OO. Filters:
1. Location: Upstream of fan section.
  2. Furnish section with integral extruded aluminum filter racks within unit.
  3. Disposable filters: Frame mounted 2 inch (50 mm) thick 30 percent efficient based on ASHRAE 52.1.
- PP. Outdoor and Return Air Section:
1. Outside Air Damper Leakage: Maximum 3.0 cfm per square foot (0.13 L/s per square meter) at 1.0 inches wg (250 Pa) pressure differential.
  2. Actuators: Furnish factory installed electric damper actuators for outside air, return air, and exhaust air dampers.
  3. Economizer: Furnish fully integrated factory installed fully modulating from 0 to 100 percent outside air. Provide economizer components and controls in accordance with ICC IECC.
    - a. Furnish economizer with differential enthalpy control.
    - b. Damper Position: Adjustable, minimum position, with remote control in conditioned space.
    - c. Furnish spring return motor for outside air damper closure during unit shutdown or power interruption.

QQ. Exhaust and Relief Air Section:

1. Barometric relief gravity type dampers to operate in conjunction with economizer. Furnish barometric relief damper capable of closing by gravity.

RR. Electrical:

1. Factory wired weatherproof control panel.
2. Single point power connection.
3. Terminal board for low voltage control wiring.
4. Branch circuit fusing, 115 volt control circuit transformer and fuse, system switches, high temperature sensor, and 115 volt ground fault receptacle with separate electrical connection.
5. Service Lights: Factory wired with switch and receptacle located in supply fan section.
6. Fan Motor Starting: Part winding start.
7. Power Factor Correction: Furnish minimum of 0.90 for compressor and supply fan motors.
8. Phase failure and under voltage protection.
9. Ground fault protection.

SS. Controls: Furnish interface to Building Automation and Control System.

TT. Controls: Microprocessor based controls, factory mounted with the following features:

1. Constant volume controls.
2. Variable air volume controls.
3. Ventilation Override: Factory installed. Binary input from independent fire or life safety panel causes unit to override standard operation and assumes one of two factory preset ventilation sequences: purge or pressurization.
4. Indoor Air Quality Control: Furnish demand ventilation control through economizer with carbon dioxide sensor. Sensor adjustable wall mounted

UU. Accessories:

1. Convenience Outlet: Factory installed, 115 volt, 15 amp, GFI type, internally mounted. Factory wired from transformer internal to unit.
2. Roof Curb Adaptor Package: Furnish duct support hardware to adapt unit to existing roof curb.

VV. Disconnect Switch: Factory mount on equipment.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's published instructions.
- B. Install temporary filters during construction period. Replace with permanent filters after Substantial Completion.

Durham Technical Community College  
**Life Sciences Building – Early Equipment Package**  
Durham, North Carolina  
Andre Johnson Architect Project No. P2309.00  
SCO ID No.:23-26245-02B  
NCCCS No.: 2731

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- C. Manufacturer's Field Services: Required.
- D. Demonstration and Training: Provide 8 hours of instruction for one person with manufacturer's representative.

**END OF SECTION 23 8100**

## **SECTION 26 0500 - GENERAL ELECTRICAL REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes General requirements for Electrical Work.
- B. Related Documents
  - 1. All work shall be subject to the requirements of Division 1 - General Requirements and shall comply with applicable requirements of the Contract.
  - 2. This Section governs all requirements as applicable to the Electrical work specified in other Sections of Division 26.

#### **1.2 DIVISION OF RESPONSIBILITY**

- A. The requirements under Section 26 0500 are intended for the party or parties who have been duly awarded the applicable portion of work to be performed under the indexed sections of Division 26 also known as the Electrical Work.
- B. In addition to electrical work required under Division 26, the scope of electrical work specified under Division 26 shall include the provision of all required power wiring and interconnections to the equipment specified under Divisions 21, 22, 23, 27 and 28. Provide power to all devices specified under the various sections of the Divisions indicated including motors, electric heaters, light fixtures, heat tracing equipment, control panels, electrically actuated valves, and dampers.

#### **1.3 REFERENCE STANDARDS**

- A. Compliance with the following codes and standards shall be required as applicable:

AEIC	Association of Edison Illuminating Companies
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASTM	American Society for Testing Materials
BOCA	Building Officials Code Administrators
DOE	United States Department of Energy
CBM	Certified Ballast Manufacturers.
DEMA	Diesel Engine Manufacturer's Association
EPA	United States Environmental Protection Agency
EPAAct	Energy Policy Act of the US Department of Energy
ETL	Intertek/Electric Testing Laboratories
ICBO	International Conference of Building Officials
ICC	International Code Council
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers

IES	Illumination Engineering Society of North America.
NCAC	North Carolina Administrative Code
NCCM	North Carolina State Construction Manual
NCBC	North Carolina Building Code
NEC	National Electrical Code
NECA	National Electrical Contractor Association
NEIS	National Electrical Installation Standards
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NETA	International Electric Testing Association
NFPA	National Fire Protection Association (2013 NFPA 72)
OSHA	Occupational Safety and Health Administration
SCO	State Construction Office
TCLP	Toxicity Characteristic Leaching Procedure
UL	Underwriters' Laboratories, Inc.

- B. Conform to materials and equipment rating standards, listings or classifications of the above organizations as well as ratings, listings or classifications accepted under local codes and laws.

#### 1.4 DEFINITIONS

- A. "Provide" means furnish and install, complete, the specified material, equipment or other item and perform all required labor to make a finished installation.
- B. "Furnish and install" has the same meaning as given above for "Provide."
- C. "Engineer" or "Architect" means the authorized representative of the Owner.
- D. Refer to General Conditions for other definitions.

#### 1.5 REVIEW OF CONTRACT DOCUMENTS AND SITE

- A. With the submission of his Bid, Contractor shall give written notice to the Owner of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of Authorities Having Jurisdiction; and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that the Contractor has included the cost of all required items in his Proposal for a complete project.
- B. Contractor shall acknowledge that he has examined the Plans, Specifications and Site, and that from his own investigations he has satisfied himself as to the nature and location of the work; the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials; availability of labor, water, electric power, roads and uncertainties of weather; the conformation and condition of the ground; the character, quality and quantity of surface and subsurface materials to be encountered; the character of equipment and facilities needed preliminary to and during the execution of the work; all federal, state, county, township and municipal laws, ordinances and regulations particularly those relating to employment of labor, rates of wages, and construction methods; and all other matters which can in any way affect the work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with the available information concerning these conditions will not

relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work.

- C. Owner assumes no responsibility for any understanding or representation made during or prior to the negotiation and execution of this Contract unless such understanding or representations are expressly stated in the Contract and the Contract expressly provides that the responsibility, therefore, is assumed by the Owner.

## 1.6 BID DOCUMENTS

- A. The drawings indicate, in schematic and diagrammatic form unless specifically dimensioned, the extent and general arrangement of the various electrical systems and do not necessarily indicate every required fitting, support or similar items required for a complete installation. Consult the architectural drawings and details for exact locations of fixtures and equipment located in finished construction and/or surfaces. Where same is not definitively located, obtain the information from the Architect before proceeding by submitting a dimensioned submittal for review. Any reasonable changes in locations indicated shall be made by the Contractor without additional cost to the Owner.
- B. Conduits and other raceway systems shall be installed as shown or as noted on the contract drawings. Elevations and dimensions where indicated are a guide only and are subject to change with actual job conditions and clearances. Relocation resulting from interferences shall be made at no additional cost to the Owner.
- C. If the Contractor deems that any departures from these drawings are necessary, detailed drawings and descriptions of these departures and a statement of the reasons shall be submitted to the Engineer for review and comment as soon as practicable. No departures from the arrangements shown on the contract drawings shall be made without prior written approval of the Engineer. Provide all devices, conduit, wire, misc. steel, etc., for a complete installation.
- D. The Contractor shall follow the drawings in laying out the work and check drawings of all trades to verify spaces in which work shall be installed. Maintain maximum headroom and where space conditions appear inadequate, the Architect shall be notified before proceeding with the installation.
- E. In general, specifications describe quality and type of material and equipment.
- F. The drawings show the various systems schematically. No added compensation shall be granted for variations due to field conditions or resulting from coordination with other trade Contractors working under other divisions of the specifications and/or design documents.
- G. Work that is reasonably inferable scope of work not shown on the drawings but called for in the specifications, or vice versa, shall be provided by the Contractor without additional expense to the Owner.
- H. Where variance occurs between the drawings and specifications, or within either document itself, the Contractor shall request, through the Construction Manager, clarification in writing from the Architect and/or Engineer as to which item and manner in the work shall be installed.
- I. The commercially standard items of equipment and the specified names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.

- J. Equipment shown on the drawings with particular manufactures identified has been coordinated for structural penetrations, electrical connection, operating and service (maintenance) requirements, and physical size with regard to the space where the equipment is shown. If they comply with the project specifications, these and the other specified manufacturers of this equipment shall be acceptable, contingent on the Contractor providing a complete installation and maintaining full responsibility to provide, at no additional cost, any modifications to the structure or electrical service that are required to properly install, operate and service the equipment being used. These modifications shall not include additional area for equipment unless approved by the Architect.
  - 1. The Contractor shall note these changes on the equipment submittal and shall show all differences in equipment being supplied from that shown on the drawings. Failure of the Contractor to provide this information with the submittal shall indicate the submitted equipment meets or exceeds in performance the equipment shown on the drawings and is physically no larger than the equipment specified.
- K. Failure of the Contractor to comply with the above and any discrepancy found shall result in the Contractor providing equipment equal to that specified at the Contractor's expense.

#### 1.7 STANDARD PRODUCTS AND APPROVED EQUAL CLAUSE

- A. Each item of equipment furnished by the Contractor shall be essentially the standard product of the manufacturer. All material and equipment shall be of the best quality normally used in good commercial practice and shall be the product of reputable manufacturers. Each major component shall bear a nameplate giving the name and address of the manufacturer and the catalog number or designation located in an easily visible location.
- B. Throughout the Specification, types of material and equipment may be specified by manufacturer's name and catalog number as a basis of design and for convenience only, and not for the purpose of limiting competition, except for items for which "no substitutions will be accepted" is specifically indicated.
- C. Where the Contractor proposes to use an item of equipment other than that specified or shown on the Contract Drawings which requires any redesign of structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign, all new drawings and detailing required therefore, shall be prepared by the Contractor without cost to the Owner and submitted to the Architect and Engineer for his review.

#### 1.8 MEASUREMENTS

- A. Contractor shall base all his measurements, both horizontal and vertical, from established bench marks. All work shall agree with these established lines and levels. He shall verify all measurements at site; and check the correctness of same as related to the work.

#### 1.9 LABOR AND MATERIALS

- A. All materials and apparatus required for the work shall be new, of first-class quality, and shall be furnished, delivered, erected, connected, and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces.



- B. Contractor shall remove all materials delivered or work erected which does not comply with Contract Drawings and Specifications, and replace with proper materials or correct such work as directed at no additional cost to the Owner.

#### 1.10 COVERING OF WORK

- A. No electrical equipment, raceways, or other work of any kind shall be covered up or hidden from view before it has been examined by the Engineer. Any unsatisfactory or imperfect work or materials that may be discovered shall be removed and corrected immediately after being rejected and other work and materials shall be provided to the satisfaction of the Engineer.

#### 1.11 PROTECTION

- A. Contractor shall protect the work and material of all trades from damage by his work or workmen, and shall replace all damaged material with new.
- B. Contractor shall be responsible for work and equipment until his work is finally inspected, tested, and accepted; he shall protect his work against theft, injury or damage; and carefully store material and equipment received on site which is not immediately installed; close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing material.
- C. Contractor shall be responsible for the preservation of all public and private property, along and adjacent to the work, and shall use every precaution necessary to prevent damage or injury thereto. He shall use suitable precautions to prevent damage to pipes, conduits and other underground structures or utilities, and shall carefully protect from disturbance or damage all property marks until an authorized agent has witnessed or otherwise referenced their location, and shall not remove them until directed.
- D. All electrical equipment delivered to the site shall have appropriate wrapping to protect them from rain, flood, wind, construction debris, and all types of water damage normally encountered at construction sites. Protection of equipment such as switchboard, transformers, panelboards, luminaires and similar equipment shall be the responsibility of the Contractor receiving such equipment at the jobsite for installation under Division 26.

#### 1.12 CUTTING AND PATCHING

- A. Provide all cutting and rough patching required for systems and equipment included in these specifications. All finish patching will be done under General Construction work.
- B. Furnish and locate all sleeves and inserts required before the floors and walls are built; Contractor shall pay the cost of cutting and patching required for pipes where sleeves and inserts were not installed in time, or where they were incorrectly located.
- C. Provide all drilling required for the installation of hangers.
- D. All holes cut through concrete slabs or arches shall be punched or drilled from the underside. No structural members shall be cut without the approval of the Structural Engineer and Architect and all such cutting shall be done in a manner as directed by the Structural Engineer.

- E. Contractor shall not do any cutting that may impair strength of building construction. No holes, except for small screws, may be drilled in beams or other structural members without obtaining prior approval. All work shall be done in a neat manner by mechanics skilled in their trades and as approved.
- F. Provide sleeves and fire stopping at piping penetrations in floor, wall and roof.

#### 1.13 SUBMITTALS

##### A. Procedure:

1. Prepare a schedule of specific submissions at the outset of the Project for the Owner's review and approval; make submissions listed below and in the other Sections of Division 26 of the Project Specifications.
  - a. If submissions listed in other Sections of Division 26 are more specific than those listed below, comply with the more specific requirements.
  - b. The purpose of submittals is to define the specific products and models the Contractor is proposing to provide to the project. As such, submittals that contain multiple manufacturers for the same product will be summarily Rejected and returned to the Contractor.
  - c. Failure of the Contractor to submit Shop Drawings in ample time for review shall not entitle him to an extension of Contract time, and no claim for extension by reason of such default will be allowed.
  - d. Piecemeal submittals are unacceptable and will not be reviewed. No submittal shall be considered for review, the review of which is contingent upon acceptance of other features for which submittals have not been submitted.
  - e. Submittals from Vendor without Contractor's review and approval stamp will not be reviewed.
  - f. Submittals shall not be used by the Contractor as a means to secure approval of a substitution. Contractor must indicate all deviations, omissions and substitutions in his submittal; if there are none of these 3 exceptions, he shall then state on the submittal: "NO EXCEPTION TAKEN". Any submittal without stated exceptions, or without statement that no exception is taken, will not be reviewed and will be rejected and returned to Contractor for rectification.
  - g. All products of a similar nature (i.e., Panelboards, fuses, wiring devices, etc.) shall be provided by one manufacturer.

##### B. Shop Drawings:

##### 1. Manufacturer's Drawings:

- a. Submit equipment listed in all applicable Sections - include material specifications, operating characteristics and finishes, and specified agency listings or approvals.
- b. Cutsheets, brochures or other literature submitted for expeditious approval but are incomplete or missing items of hardware or software (performance data) shall be re-submitted until all system or equipment components have been reviewed and approved. Any item not included in the original or first submission shall be considered outstanding work until such item of equipment or work has been submitted or installed in place exactly conforming to the intent of the contract documents.

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- c. Contractor shall provide preliminary layout drawings of all major pieces of equipment (i.e., switchgear, switchboards, transformers), confirming that the submitted product physically fits within the architectural enclosures. This drawing is required along with the manufacturer's product data.

2. Installation Drawings:

- a. Furnish coordinated drawings of equipment installation, including interconnecting conduit and supports. Minimum scale for these drawings shall be 1/4 inch equals one foot.
- b. Coordinate space requirements for mechanical, plumbing, and other trades in the vicinity of work.
- c. Include connections, anchorages, and fastenings for equipment and conduit.
- d. Make allowance for clearances for access to and maintenance of equipment.
- e. Do not install any conduits or equipment in any area prior to obtaining approval of its layout by means of submitting shop drawings.
- f. Any missing items of equipment, material, or labor during initial submission of shop drawings are to be completed and re-submitted for final approval. Shop drawings should not be used as a vehicle for obtaining variances, deviation, or omission from the scope of Contract Documents. Approval of a submittal shall pertain to the portions that conform to the intent of the Contract Documents.
- g. Submission of any missing, incomplete, or otherwise deviant layout is subject to re-submission until all contract requirements have been properly included or shown on the same layout.

C. Reports:

1. Compliance with listings and approvals for equipment and for fire ratings.
2. Acceptance certificates from inspecting agencies.
3. Complete printed and illustrated operating instructions where required in report format.
4. Manufacturer's performance tests on operating equipment.
5. Performance reports for vibration isolation equipment.
6. Additional reports as noted in other sections.

D. Specific references to any article, device, product, material, fixture, or item of equipment by name, make, or catalog number shall be interpreted as establishing a basis of cost and a standard of quality. All devices shall be of the make and type listed by Special Agencies, such as the Underwriters' Laboratories, and where required, approved by the Authority Having Jurisdiction.

E. Contractor shall be responsible for any deviations from specified products in equipment size or configuration and access requirements.

F. It is the responsibility of the electrical contractor to notify the state electrical inspector with the Department of Administration to schedule required inspections.

1.14 COORDINATION

- A. Contractor shall prepare preliminary shop drawings suitable for use in coordinating his work with the work of other trades. The Contractor for Division 23 HVAC Section shall prepare and furnish background drawings with ductwork at 3/8" = 1'-0" scale for all trades to indicate piping, cable tray, and conduit in relation to all structural elements of the construction, including floor

elevations; steel locations, size, and elevations; partitions locations; door locations and direction of swing; and all other information required to assure coordination of the electrical, sheet metal, and piping trades and fire protection in relation to the Architectural function of the project. Coordination meetings shall be held under the supervision of the Construction Manager (CM). Each trade shall have proper representation at all coordination meetings for the purpose of detailing, on the drawings mentioned above, the exact location and routing of their work. After the conclusion of the coordination at the working meetings, each trade shall sign the coordinated drawing original, copies of which shall be distributed by the CM to all parties concerned including the Owner. Final shop drawings of all trades shall be in accordance with the coordinated drawing, after which final shop drawings shall be submitted for final approval.

- B. If the trade contractor installs work so as to cause interference with work of other trades, he shall make necessary changes in work to correct the condition without extra charge.
- C. Dimensional layout plans of equipment rooms shall be made showing all bases, pads, and inertia blocks required for electrical equipment. Include dimensions of bases, bolt layouts, details, etc.
- D. Contractor shall furnish all necessary templates, patterns, etc. for installing work and, for the purpose of making adjoining work conform, furnish setting plans and shop details to other trades as required.

#### 1.15 EXCAVATION AND BACKFILLING

- A. Excavation and backfilling of trenches required for the installation of all underground service piping is to be provided by each respective Section involved.
- B. Trenching: Excavate to required depth and grade. Each trade will be responsible for the required slopes, inverts, bed material, and all other pertinent requirements.
- C. Bottom of trench shall be accurately excavated to provide firm, uniform bearing for bottom of the pipe. Pipe having bells, sleeves, or other enlargement at joints to have recesses excavated to accommodate these joints.
- D. Backfilling: Trenches shall not be backfilled until piping has been tested. Backfill consisting of sand or selected excavated material shall be placed to a level equal to the final grade and hand compacted as required to produce the same density as the soil in the surrounding areas. Furnish and run constantly, if required or directed, sufficient pumping machinery to keep trenches free from water up to the time of inspection and acceptance of that part of this work.
- E. Refer to General Conditions for additional requirements governing excavation and backfilling. These requirements shall prevail unless superseded by specific requirements in Division 26.
- F. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be approved before work is performed. Each Trade Contractor shall provide all necessary sleeves, caulking, and flashing required to make openings watertight.
- G. Provide proper supports to sure up trenches and excavations per OSHA requirements.

#### 1.16 CONCRETE AND GROUTING

- A. Requirements for concrete and grouting are specified in other Sections.
  - 1. Concrete shall be 3,500-psi stone concrete with water reducing admixture, except where otherwise specified.
  - 2. Concrete shall have air entraining admixture where exposed to weather.
  - 3. Concrete shall be mechanically consolidated to eliminate voids or air pockets in the concrete.
- B. Contractor shall make coordinated layouts showing concrete work required for housekeeping pads, roof curbs, etc. which are cast in place.
- C. Concrete housekeeping pads: 4" minimum thickness, sized to cover the full area of each piece of equipment provided plus 4" on each side.
- D. Concrete bases: Dimension and height to suit the equipment.
- E. Outside the building all concrete work related to electrical equipment shall be provided by the Trade Contractor of Division 26, unless otherwise noted in the Contract Documents.

#### 1.17 ACOUSTICAL PERFORMANCE OF EQUIPMENT AND SYSTEMS

- A. All work shall be designed to operate, and shall operate, under all conditions of load, without any objectionable sound or vibration. Sound or vibration noticeable outside of the room in which installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable and caused by failure to follow the Contract Documents or manufacturer's installation instructions shall be corrected in an approved manner by the Contractor at his expense.

#### 1.18 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Instructions and Demonstration for Owner's Personnel:
  - 1. After all equipment is functioning properly, each system is to be automatically operated for ten (10) working shifts, and not to be adjusted during this period. Any adjustments will void the test and start the time period all over again.
  - 2. During this period, instruct the Owner's personnel in the use, operation, and maintenance of all equipment of each system. Teaching will include lecture-type instruction given in a non-machine room environment. During the lesson, normal operation of the system installed and operating will be explained, along with troubleshooting procedures. This will be followed by a field inspection and demonstration of equipment.
  - 3. The above instruction is exclusive of that required of specified equipment manufacturers. If more stringent or longer instruction is indicated for specific equipment or systems, these requirements shall supersede the above requirements.
- B. Operating and Maintenance Data:
  - 1. Provide one (1) complete set of manufacturer's catalogues, instructions, maintenance, repair information, and parts lists for operating equipment and devices in pdf format.

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- a. Include coordination curves for overcurrent protective devices (fuses, circuit breakers and protective relays), factory furnished wiring diagrams, and control diagrams.
2. Data for the equipment actually installed is to be submitted.
3. The data is to be carefully checked for accuracy by comparison with the installed equipment nameplates.
4. Provide a recommended list of spare parts for equipment and list of special, non-standard tools to service equipment.
5. In addition, follow all requirements of Division 1 - General Requirements.

#### 1.19 RECORD DRAWINGS

- A. Provide and maintain a currently up-to-date record set of reproducible prints showing all changes, additions, or omissions made during construction that will be given to the design team to produce the Record Drawings.
- B. Shop Drawings shall be cross-referenced on the Record Drawings for this requirement where applicable.
- C. Submit AutoCAD, or other as required by Owner, compatible as-built drawing files.

#### 1.20 WARRANTY

- A. The following supplements the GENERAL CONDITIONS for Electrical Work:
  1. Warranty time limits for equipment exceeding those indicated in Division 01 - GENERAL REQUIREMENTS are specified in the applicable Sections of Division 26.
- B. In addition, follow all requirements of Division 1 - General Requirements for Close-out Procedures, Operation and Maintenance Data and Project Record Documents.

### PART 2 - PRODUCTS

#### 2.1 IDENTIFICATION

- A. Refer to Section 26 0553 for requirements.

#### 2.2 ACCESS DOORS

- A. General:
  1. Access doors shall be per the architectural specifications.
  2. Steel, flush, four-sided frame and door assembly, chemically cleaned after fabrication and painted with rust-inhibitive primer.
  3. Provide hardware and locking devices.

4. Provide access doors required for access to electrical work through finished wall construction and non-removable ceiling construction.
  5. Deliver doors and location information to appropriate trade for installation.
  6. Security Areas shall be provided with security access doors.
- B. Furnish for installation by the appropriate trade, flush-type access door or panel no smaller than 18" x 18" and no larger than 30" x 30" for all junction or pull boxes located in chases, walls, non-accessible hung ceilings, or floors. Finish shall be prime coat, except floor panels which shall be polished brass or chrome plate. Doors and trim 14-gauge steel, frame 16-gauge steel, with flush concealed and standard flush locks, screwdriver operated cams, of Milcor, Nystrom, Acudor, or approved equal.
1. All panels and their exact location subject to approval of the Architect.
  2. Where space conditions prevent door swinging open, provide removable door on lift-up hinges. This will only be accepted on a case-by-case basis. This condition must be submitted to the Owner and Engineer for approval prior to installation.
  3. Furnish a complete list locating all access doors required in finished walls, ceilings, partitions, shafts, and other inaccessible locations.

## 2.3 PAINTING

- A. All conduit, outlet boxes, pull boxes, splice boxes, supports, and miscellaneous electrical equipment within all Mechanical and Electrical equipment rooms shall be painted (prime and finish) as specified herein.
- B. All exposed equipment, enclosures, conduits, boxes and supports, except factory finished equipment, shall be painted. All un-galvanized surfaces shall be painted with zinc chromate, or approved equal primer. Galvanized steel surfaces shall be prime coated with a dry film thickness of 0.50 mils with one-coat of PPG ACRI-PRO 100 primer (PP335), or approved equal.
- C. Unless otherwise specified on the drawings, the Contractor performing the work specified under Division 26 shall provide finish painting of all prime-painted electrical equipment described above.
- D. All exposed equipment, enclosures, conduits, boxes, and supports, except factory finished equipment, shall be finish painted with two coats of finish paint. Finish paint shall be compatible with the applied primer. Finish painting shall be performed as specified under the requirements of Division 9. The color of the finish paint shall be as determined by the Architect or Engineer from the paint manufacturer's standard colors.
- E. All damaged factory-painted surfaces shall be repaired to match the original surface. If, in opinion of the Owner, such repairs are unsatisfactory, the item in question shall be completely refinished or replaced with new.

## 2.4 CLEANING AND ADJUSTING

- A. Notification:
1. Inform Owner and Architect's field representatives of all cleaning schedules one week prior to starting.

2. Notify Owner and Architect again, 48-hours prior to each event. If neither attends the procedures, notify in writing, the specific task performed 24-hours after each event.
  3. Damage to the building and equipment resulting from tests shall be repaired at no additional cost to the Owner.
  4. Tests claimed to have been performed without following above procedures shall be deemed as not performed.
- B. Cleaning:
1. Clean out all debris and dirt from the interior of all switchboards, panelboards, transformers, and switches. Blow out transformers with dry nitrogen; pressure shall not exceed 15 psi. Use Vacuum cleaner with bag and cartridge filters to remove dirt and debris from the interior of switchboards, panelboards and switches. After cleaning, the systems shall be tested by an independent organization.
  2. Clean all materials and equipment; leave in condition ready to operate and ready to receive succeeding finishes where required.
  3. Clean the operating equipment and systems to be dust free inside and out.
- C. Permanent Equipment Operating During Construction:
1. Use only in same service as the permanent applications.
  2. Expendable media, including lamps used for temporary operation and similar materials are to be replaced just prior to acceptance.
- D. Retouch or repaint equipment furnished with factory finish as required to provide same appearance as new.
- E. Tools:
1. Provide one set of specialized or non-standard maintenance tools and devices required for servicing the installed equipment.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Temporary Protection:
1. Provide and maintain protection for the work whether completed or in progress.
  2. Provide suitable coverings and enclosures.
- B. Scaffolding, Rigging and Hoisting:
1. Provide all scaffolding, rigging, and hoisting services necessary for erection, and/or delivery into the premises, of any equipment and apparatus furnished. Remove from the premises when no longer required.
- C. Waterproofing:



1. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Architect before work is done. The Contractor shall provide all necessary sleeves, caulking and flashing required to make openings absolutely watertight.

D. Temporary Lighting and Power

1. Provide temporary light and power system, as part of the contract, adequate for the requirements of all trades during construction. Temporary system shall be disconnected and removed when permanent service is in operation.

3.2 EQUIPMENT BASES, PLATFORMS AND SUPPORTS

- A. Provide supporting platforms, steel supports, anchor bolts, inserts, etc., for all equipment and apparatus requiring access for service and maintenance.
- B. Obtain prior approval for installation method of structural steel required to frame into building structural members for the proper support of equipment, conduit, etc. Welding will be permitted only when approved by the Architect or the Structural Engineer.
- C. Submit shop drawings of supports for approval to the Architect before fabricating or constructing.
- D. Provide leveling channels, anchor bolts, complete with nuts and washers, for all apparatus and equipment secured to concrete pads and further supply exact information and dimensions for the location of these leveling channels, anchor bolts, inserts, concrete bases and pads.
- E. Where supports are on concrete construction, take care not to weaken concrete or penetrate waterproofing.

3.3 ACCESSIBILITY

- A. The installation of electrical equipment, including panelboards, disconnect switches, motor starters, etc., shall be in accordance with the requirements of Article 110 of the NEC relative to working space around equipment. Equipment which is installed and does not have the working space required by the NEC, shall be relocated by the Contractor at no additional cost to the Owner.

3.4 USE OF EQUIPMENT

- A. The use of any equipment, or any part thereof, for purposes other than testing even with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor shall it be construed to obligate the Owner in any way to accept improper work or defective materials.
- B. Use of permanent equipment for temporary services must be approved in writing by Owner.

3.5 CODES, RULES, & APPROVALS

- A. The Contractor shall give all necessary notices, and obtain all approval documents in connection with his work. However, all utility connections, extensions, and tap fees for water, storm, sewer, gas, telephone, and electricity shall be paid directly to utility companies and/or agencies by the Owner, unless otherwise indicated. The Contractor shall file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver same to the Owner's Representative before request for acceptance and final payment for the work.
- B. The complete design and construction shall conform to the requirements of the NCAC, NCCM, NCBC, and any other local or state code which may govern.

### 3.6 FINAL REVIEW

- A. Contractor shall arrange and schedule final review of work and shall notify the Architect in writing that the Contractor has thoroughly checked his work and, in the opinion of the Contractor, is ready for final review.
- B. During the entire period scheduled for these reviews, the Contractor and representatives of each manufacturer of equipment involved shall be present. All of these organizations shall have sufficient and competent personnel present so that adjustments can be made to all systems without delay.

### 3.7 ACCEPTANCE

- A. The operation or the temporary use of the equipment and the mechanical and electrical installation, by the Owner does not constitute an acceptance of the work. The final acceptance is to be made after SCO, design team sign off and the Contractor has adjusted his equipment, demonstrated that it fulfills the requirements of the Contract Documents, and has furnished all the required Certificates. Warranties and guaranties are effective after the acceptance.

## END OF SECTION 26 0500

## **SECTION 26 0502 - INSPECTION AND TESTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. This Section specifies the Contractor's inspections and tests, which are a part of the Contract Work. Testing shall include the following:
  - a. Switchboard and Switchgear
  - b. Cables - Low Voltage - 600V
  - c. Switches - Low Voltage
  - d. Circuit Breakers - Low Voltage
  - e. Engine Generators
  - f. Automatic Transfer Switches

- B.** The Contractor shall perform routine insulation resistance, continuity, and phase rotation tests for all distribution and utilization equipment prior to and in addition to tests performed by the testing firm specified herein.

- C.** The Contractor shall supply a suitable and stable source of electrical power to each test site. The testing firm shall specify the power requirements.

- D.** The Contractor shall notify the testing firm when equipment becomes available for acceptance testing. Work shall be coordinated to expedite project scheduling.

- E.** The testing firm shall notify the Consultant 48 hours prior to the commencement of any testing.

- F.** Any system, material or workmanship which is found to be defective on the basis of acceptance testing shall be reported to the Consultant.

- G.** The testing firm shall maintain a written record of all tests and, upon completion of the project, shall assemble and certify a final test report.

**H. Related Sections:**

1. Section 26 0519: Low Voltage Power Conductors and Cables
2. Section 26 0526: Grounding and Bonding for Electrical Systems
3. Section 26 2416: Panelboards
4. Section 26 2819: Enclosed Switches
5. Section 26 3213: Engine Generators
6. Section 26 2826: Enclosed Transfer Switches

#### **1.2 REFERENCES**

- A.** American National Standards Institute (ANSI)

1. ANSI C2 - National Electrical Safety Code.
- B. International Electrical Testing Association (NETA)
  1. ANSI/NETA ATS-2017 - Standard for Acceptance Testing Specification.
  2. ANSI/NETA MTS-2019 - Standard for Maintenance Testing Specification.
- C. National Fire Protection Association (NFPA)
  1. NFPA 70 - The National Electrical Code.
    - a. NFPA 70B - Electrical Equipment Maintenance.
    - b. NFPA 70E - Standard for Electrical Safety in the Workplace.
- D. Occupational Safety and Health Administration (OSHA) Regulations.
- E. Manufacturer's instruction manuals.
- F. Equipment shop drawings for equipment installed on the project.

### 1.3 SUBMITTALS

- A. Qualifications of the Testing firm, including current OSHA accreditation or NETA member status.
- B. Test reports for each piece of equipment on the project tested, typed, bound and labeled. The report shall include:
  1. Summary of project.
    - a. List of test equipment used, including manufacturer, model number and serial number, and the most recent calibration date for each piece of test equipment.
    - b. Listing of equipment tested.
    - c. Test results.
    - d. Recommendations.
- C. Furnish copies of the complete test report to the Consultant within 7 days of the completion of testing.

### 1.4 QUALITY ASSURANCE

- A. Perform electrical testing in accordance with NETA Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems and the manufacturer's instructions.

### 1.5 QUALIFICATIONS

- A. Engage an experienced firm specializing in testing and adjusting of systems and equipment specified in this Section. Firm shall have performed Inspection and Testing on projects similar

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in cost, material, design, and extent to the work indicated in this Section, and Inspection and Testing work has resulted in demonstrated successful operation of the installed equipment.

- B. The testing firm shall be a corporately and financially-independent test organization which can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems evaluated by the testing firm.
- C. The testing firm shall meet OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907, or be a Full Member Company of the International Electrical Testing Association (NETA).
- D. The lead on-site technical person shall be currently certified by NETA in electrical power distribution system testing.

#### 1.6 PRE-TESTING CONFERENCE

- A. Convene one (1) week prior to commencing work of this Section, under provisions of General Conditions.

### PART 2 - MATERIALS - NOT USED

### PART 3 - EXECUTION

#### 3.1 INSPECTION

- A. Installations will be subject to review by the Engineer. Where equipment, material or workmanship does not conform to the requirements of the specifications or the Contract Documents, the work shall be corrected to the satisfaction of the Engineer at no additional cost to the owner.

#### 3.2 TESTING FIRMS

- A. ABM Electrical Power Services, LLC
- B. Electrical Power Systems, Inc
- C. Electrical Reliability Services
- D. Power Products & Solutions, LLC
- E. Other NETA full member companies may be located by contacting the NETA office at (888) 300-6382 or <http://www.netaworld.org>.

#### 3.3 EXAMINATION

- A. Verify that systems are complete before commencing work. Ensure the following conditions:

1. Proper anchorage, required area clearances and proper alignment.
  - a. Inspect for physical damage, insulation contaminants, condensation or debris.
  - b. Compare equipment nameplate information with the latest one-line diagram and latest shop drawings with Engineer's Action Stamp; report discrepancies.
  - c. Verify fuse and/or circuit breaker sizes and types correspond to drawings.
  - d. Verify the location and condition of all safety grounds.
- B. Submit field reports. Report defects and deficiencies noted during the performance of services which prevent system testing.
- C. Beginning of work means acceptance of existing conditions.

### 3.4 PREPARATION

- A. Safety and Precautions: Safety practices shall include, but are not limited to, the following requirements:
  1. Occupational Safety and Health Act.
  2. Applicable state and local safety operating procedures.
  3. NFPA 70E.
  4. American National Standards for Personnel Protection.
- B. All tests shall be performed with equipment de-energized. Safety grounds shall be installed where required, except where such grounds conflict with testing requirements.
- C. The testing firm shall have a designated safety representative on the project to supervise the testing operations with respect to safety.
- D. Provide instruments required for testing and adjusting equipment and systems. Make instruments available to the Consultant and Resident Engineer to facilitate spot checks during tests.

### 3.5 INSPECTION AND TESTING

- A. Cables - Low Voltage - 600V maximum:
  1. Test in accordance with NETA ATS Section 7.3.2.
- B. Switches - Low Voltage:
  1. Test in accordance with NETA ATS Section 7.5.1.
- C. Circuit breakers - Low voltage:
  1. Test in accordance with NETA ATS Section 7.6.1.1.
- D. Grounding System:
  1. Test in accordance with NETA ATS Section 7.13.

E. Engine Generators:

1. Test in accordance with NETA ATS Section 7.22.1

F. Automatic Transfer Switches

1. Test in accordance with NETA ATS Section 7.22.3

3.6 SCHEDULE

A. New equipment requiring inspection and electrical testing:

1. Low voltage conductors No. 2 AWG and larger
2. Molded case/Insulated case circuit breakers, 100A and larger
3. Low voltage power circuit breakers
4. Fusible and non-fusible switches
5. Ground systems
6. Engine Generator
7. Automatic Transfer Switches

**END OF SECTION 26 0502**





## **SECTION 26 2413 - SWITCHBOARDS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes distribution switchboards.
- B. Related Sections:
  - 1. Section 26 0526 - Grounding and Bonding for Electrical Systems.
  - 2. Section 26 0553 - Identification for Electrical Systems.
  - 3. Section 26 2813 - Fuses.

#### **1.2 REFERENCES**

- A. American National Standards Institute:
  - 1. ANSI C12.1 - Code for Electricity Metering.
  - 2. ANSI C39.1 - Requirements, Electrical Analog Indicating Instruments.
- B. Institute of Electrical and Electronics Engineers:
  - 1. IEEE C57.13 - Standard Requirements for Instrument Transformers.
  - 2. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
- C. National Electrical Manufacturers Association:
  - 1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
  - 2. NEMA FU 1 - Low Voltage Cartridge Fuses.
  - 3. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
  - 4. NEMA PB 2 - Deadfront Distribution Switchboards.
  - 5. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less.
- D. International Electrical Testing Association:
  - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

#### **1.3 SUBMITTALS**

- A. Refer to Division 01 3300 - Submittal procedures.

- B. Shop Drawings: Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars for each phase, neutral, and ground; and switchboard instrument details.
- C. Product Data: Submit electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of equipment and components.
- D. Test Reports: Indicate results of factory production and field tests.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Refer to Division 01 7700 - Closeout procedures.
- B. Project Record Documents: Record actual locations, configurations, and ratings of switchboards and their components on single line diagrams and plan layouts.
- C. Operation and Maintenance Data: Submit spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

#### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in 48 inch (1.2 m) maximum width shipping splits, individually wrapped for protection and mounted on shipping skids.
- B. Accept switchboards on site. Inspect for damage.
- C. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle in accordance with NEMA PB 2.1. Lift only with lugs provided. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

#### 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Refer to Division 01 6000 - Product Requirements.
- B. Conform to NEMA PB 2 service conditions during and after installation of switchboards.

#### 1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 MAINTENANCE MATERIALS

- A. Furnish two (2) of each key.
- B. Furnish two (2) fuse pullers.

1.10 EXTRA MATERIALS

- A. Furnish three (3) of each size and type of fuse installed.

PART 2 - PRODUCTS

2.1 SERVICE/DISTRIBUTION SWITCHBOARDS

- A. Manufacturers:
  - 1. Eaton.
  - 2. Siemens.
  - 3. Schneider Electric, Square D.
  - 4. Substitutions: Division 01 6000 - Product Requirements.
- B. Product Description: NEMA PB 2, enclosed switchboard with electrical ratings and configurations as indicated on Drawings.
- C. Service Conditions:
  - 1. Temperature: 40 degrees F.
- D. Service switchboard:
  - 1. Provide utility
- E. Device Mounting:
  - 1. Main Section: Individually mounted devices.
  - 2. Distribution Section: Individually mounted for devices over 800 ampere, group mounted for devices 800 ampere and smaller.
- F. Bus:
  - 1. Material: Copper with silver plating, standard size.
  - 2. Connections: Bolted, accessible from front for maintenance.
  - 3. Insulation: Fully insulate load side bus bars.
- G. Ground Bus: Extend length of switchboard.
- H. Line and Load Terminations:

1. Devices over 800 ampere – Front and rear accessible, rear connected. Suitable for conductor materials and sizes as indicated on Drawings.
  2. Devices 800 ampere and below – Front accessible only, front connected. Suitable for conductor materials and sizes as indicated on Drawings
- I. Provide separations between vertical sections of switchboard where indicated on drawings.
  - J. Enclosure: Type 1 - General Purpose.
  - K. Align sections at front and rear.
  - L. Provide hinged, lockable doors in the rear of each switchboard section.
  - M. Switchboard Height: 90 inches, excluding floor sills, lifting members and pull boxes.
  - N. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.
  - O. Mimic Bus: Show bussing, connections and devices in single line form on front panels of switchboard using red color plastic strips.

## 2.2 MAIN DEVICE

- A. Secondary Main Device: Two-step stored energy electronic trip, insulated case circuit breaker.
  1. Nominal Voltage: 600 V, 3 phase, 60 Hz.
  2. Ampacity rating: 2500 amperes (100% rated), continuous.
  3. Circuit protective devices shall be two-step stored energy type circuit breaker.
  4. Circuit breaker trip system shall be a microprocessor-based true rms sensing design, Micrologic type with Powerlogic data communication features. Communication feature shall be prewired through the switchboard section and circuit monitor shall be provided for external BMS/network connection.
  5. The integral trip system shall be independent of any external power source and shall contain no less than industrial grade electronic components.
  6. Circuit breaker shall be equipped with back-up thermal and magnetic trip system.
  7. The ampere rating of the circuit breaker shall be determined by the combination of an interchangeable rating plug, the sensor size and the long-time pickup adjustment on the circuit breaker. The sensor size, rating plug and switch adjustments shall be clearly marked on the face of the circuit breaker. Circuit breakers shall be UL Listed to carry 100% of their ampere rating continuously.
  8. The following time/current response adjustments shall be provided. Each adjustment shall have discrete settings and shall be independent from all other adjustments:
    - a. Long Time Pickup & Long Time Delay
    - b. Short Time Pickup & Short Time Delay ( $I^2t$  IN &  $I^2t$  OUT)
    - c. Instantaneous Pickup.
  9. A means to seal the rating plug and trip unit adjustments in accordance with NEC Section 240-6(b) shall be provided.
  10. Local visual trip indication for overload and short circuit and trip occurrences shall be provided.

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11. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided.
12. Long Time Pickup indication to signal when loading approaches or exceeds the adjusted ampere rating of the circuit breaker shall be provided.
13. The trip system shall include a Long Time memory circuit to protect against intermittent overcurrent conditions above the long time pickup point. Means shall be provided to reset Long Time memory circuit during primary injection testing.
14. Circuit breaker trip system shall be equipped with an externally accessible test port for use with a Universal Test Set. Provide one (1) Universal Equipment Test Set for this project job for final inspection. This test set shall be suitable for testing all electric circuit breakers specified for this project. No disassembly of the circuit breaker is required for testing.
15. Communications capabilities for remote monitoring of circuit breakers trip system, to include phase and ground fault currents, pre-trip alarm indication, switch settings and trip history information shall be provided.
16. True two-step stored energy mechanism with five (5) cycle closing time shall be provided. All circuit breakers shall have multiple CHARGE/CLOSE provisions allowing the following sequence:

CHARGE, CLOSE, RECHARGE, OPEN/CLOSE/OPEN.

17. Local control pushbuttons to OPEN and CLOSE circuit breaker shall be provided. Color coded visual indication of contact position (OPEN or CLOSED) shall be provided on the face of the circuit breaker. Local manual charging following CLOSE operation shall be provided. Color coded visual indication of mechanism CHARGED and DISCHARGED position shall be provided on the face of the circuit breaker.
18. Provide the following interlocking capabilities: cell door interlock.
19. Terminations: All lugs shall be UL Listed to accept solid and/or stranded copper conductors. Lugs shall be suitable for 90° C rated wire, sized according to the 75° C temperature rating in the NEC. All cable connections shall be front accessible and front connected.
20. Individually drawout mounted:
  - a. Main circuit breaker shall be individually drawout mounted.
  - b. Sturdy drawout rails shall be permanently attached to the sides of the breaker compartment and retract into the compartment when not in use.
  - c. When fully withdrawn, the circuit breaker shall permit access for inspection and testing. Circuit breaker(s) shall also be removable from the rails completely.
  - d. When the circuit breaker is in the Connected, Test, or Disconnected positions, or when the circuit breaker is removed from the compartment, the compartment door shall be able to be fully closed and secured.
  - e. A removable crank shall be supplied with each Drawout Switchboard for racking the circuit breaker between the Connected, Test, or Disconnected positions.
21. Provide floor crane for removal/lowering of the main circuit breaker.

## 2.3 MOLDED CASE CIRCUIT BREAKERS

### A. Manufacturers:

1. Eaton.
2. Siemens.

3. Schneider electric, Square D.
  4. Substitutions: Division 01 6000 - Product Requirements.
- B. Provide 3 pole, 600 volts, 60 Hertz group mount type circuit breakers, ratings as noted on the drawings.
- C. Provide circuit breakers with quick make-quick break over center independent switching mechanisms mechanically trip-free from handle and from closing motor so that contacts cannot be held closed against short circuit or abnormal currents.
- D. Provide breakers with toggle type handles, ground and polished latch surfaces, non-welding silver alloy contacts, tamperproof calibration adjustments, clearly indicated “on”, “off” and “tripped” position indication, front accessible, manually operated “push-to-trip” button to manually trip breaker.
- E. Switchboard Circuit Breakers: NEMA AB 1, group mount type circuit breakers with solid-state electronic trip unit and data communication features. Circuit breakers shall have an interrupting rating of 65KAIC minimum.
- F. Circuit breakers shall be group mounted and front connected.
- G. Load Terminations: Accessible from the front of the switchboard, suitable for the conductor materials and sizes indicated.

## 2.4 TRANSIENT VOLTAGE SUPPRESSION DEVICES

- A. Manufacturers:
1. Eaton.
  2. Siemens.
  3. Schneider Electric, Square D.
  4. Substitutions: Division 01 6000 - Product Requirements.
- B. Product Description: IEEE C62.41, factory-mounted transient voltage surge suppressor, selected to meet requirements for medium exposure and to coordinate with system circuit voltage.

## 2.5 POWER METERS

- A. Manufacturers:
1. Schneider Electric, Square D.
  2. Substitutions: Division 01 6000 - Product Requirements.
- B. Provide model 8000 series power logic meter by Square D. Provide all required components including software license.
- C. Provide connection to the power monitoring network switch over RS-485 network using BAC-NET communication protocol. Provide all required accessories and wiring for fully operational system.

- D. Furnish meters with appropriate multiplier tags.

## 2.6 METERING TRANSFORMERS

- A. Manufacturers:
  - 1. Eaton.
  - 2. Siemens.
  - 3. Schneider Electric, Square D.
  - 4. Substitutions: Division 01 6000 - Product Requirements.
- B. Current Transformers: IEEE C57.13; 5 ampere secondary, bar or window type, with double secondary winding and secondary shorting device, primary/secondary ratio as indicated on Drawings, burden and accuracy consistent with connected metering and relay devices, 60 Hertz.
- C. Potential Transformers: IEEE C57.13; 120 volt double secondary, disconnecting type with integral fuse mountings, primary/secondary ratio as indicated on Drawings, burden and accuracy consistent with connected metering and relay devices, 60 Hertz.

## 2.7 SOURCE QUALITY CONTROL

- A. Furnish shop inspection and testing in accordance with NEMA PB 2.
- B. Make completed switchboard available for inspection at manufacturer's factory prior to packaging for shipment. Notify Architect/Engineer at least seven days before inspection is allowed.
- C. Allow witnessing of factory inspections and tests at manufacturer's test facility. Notify Architect/Engineer at least seven days before inspections and tests are scheduled.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Refer to Division 1 - Coordination and project conditions.
- B. Verify surface is suitable for switchboard installation.

### 3.2 INSTALLATION

- A. Install in accordance with NEMA PB 2.1 on 4" high concrete housekeeping pad.
- B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.
- C. Install engraved plastic nameplates in accordance with Section 26 0553.

- D. Install breaker circuit directory.
- E. Ground and bond switchboards in accordance with Section 26 0526.

### 3.3 FIELD QUALITY CONTROL

- A. Refer to Division 1 - Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.1.

### 3.4 ADJUSTING

- A. Adjust operating mechanisms for free mechanical movement.
- B. Tighten bolted bus connections.
- C. Adjust circuit breaker trip and time delay settings to values as per circuit breaker time coordination study specified in section 26 0573.

### 3.5 CLEANING

- A. Vacuum entire switchboard inside and outside.
- B. Touch up scratched or marred surfaces to match original finish.

## END OF SECTION 26 2413