

# PROJECT MANUAL

## WAKE COUNTY OFFICE BUILDING 12th & 14th Floors Upfit

337 South Salisbury Street  
RALEIGH, NC  
27601

**Bid / Permit Set**  
**February 12, 2025**



**HUFFMAN**  
**ARCHITECTS**

632 Pershing Road  
Raleigh, North Carolina 27608

HA Project Number: 2314  
Book 1 of 1  
Divisions 1 through 28



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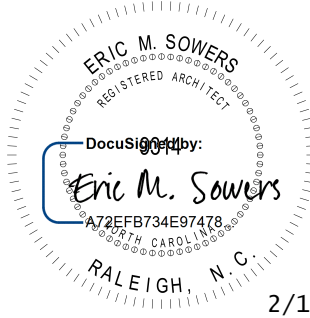


**WAKE COUNTY OFFICE BUILDING  
12th & 14th Floors Upfit**

**Huffman Architects, PA**

**Architect:**

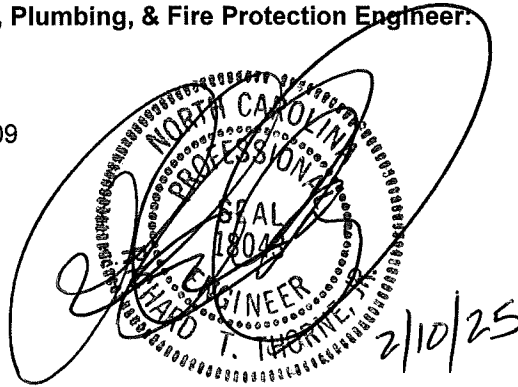
Huffman Architects, PA  
632 Pershing Road  
Raleigh, NC 27608



2/11/2025

**Mechanical, Electrical, Plumbing, & Fire Protection Engineer:**

HDM Associates, Inc.  
106 Tarheel Court  
Elizabeth City, NC 27909







**NOTICE TO BIDDERS  
RFB 25-021**

Sealed proposals will be received by Wake County Procurement Services, in Suite 2900, Wake County Justice Center, 301 McDowell Street, Raleigh, NC 27601, up to **3:00 p.m., Thursday March 13, 2025**, and immediately thereafter publicly opened and read for providing labor, material and equipment entering into the **12<sup>th</sup> & 14<sup>th</sup> Floors Upfit** located in the Wake County Office Building in Raleigh, NC.

A non-mandatory Pre-Bid Conference will be held on February 20, 2025, at 9:30 a.m. in the Wake County Office Building 337 S. Salisbury St, Raleigh, NC 27601, in G183 Refinery – Large Meeting Room.

**Notice of Public Meeting for Proposed Alternate Bids for Preferred Products.**

An open public meeting will be held on February 20, 2025, at 9:30 a.m. following the Pre-Bid. The meeting is to identify preferred brand alternates and their performance standards pertinent to this project. In accordance with GS133-3, Section 64. (C) the following preferred brand items are being considered as an Alternate by the owner for this project:

- Preferred Alternate 1: Mechanical Locksets – Provide Schlage L9000 series mortise locksets to match the existing building locksets.
- Preferred Alternate 2: Electromechanical Locksets – Provide Schlage L9000 series mortise locksets to match the existing building locksets.
- Preferred Alternate 3: Electromechanical Exit Devices – Provide Sargent 80 series exit devices to match the existing building devices.
- Preferred Alternate 4: Cylinders – Provide Corbin Russwin to match the existing building devices.

An electronic copy of the contract documents (PDF) may be obtained from Accent Imaging free of charge beginning **Wednesday February 12, 2025**. Printed copies of the plans and specifications may be purchased from Accent Imaging online or at (919)782-3332. Plans may be accessed for viewing and download at <http://www.planscope.com/>. Questions or substitution requests should be directed to Tara Reed, at tara@esse-architects.com.

Wake County provides minorities and women equal opportunity to participate in all aspects of its construction program consistent with NCGS §143-8. Bidders shall comply with the requirements of the Wake County Minority Business Enterprise Program, as outlined in Section 00 5000 of the Project Manual.

No bid may be withdrawn for sixty (60) days after the scheduled closing time for bids.

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

Signed: COUNTY OF WAKE  
By: David Rutherford  
Facilities Design & Construction

DESIGNER: Huffman Architects, PA  
632 Pershing Road  
Raleigh, NC 27608  
Tel: (717) 644-1562

## INSTRUCTIONS TO BIDDERS

For a Proposal to be considered, it must be in accordance with the following instructions:

### 1. PROPOSALS

Proposals must be made on the Bid Proposal Forms provided herein, and all blank spaces for Bids, Alternates and Unit Prices, applicable to bidder's work, shall be properly filled in. When requested Alternates are not Bid, the Proposal may be considered nonresponsive. The Bidders agree that Bids submitted on the specified Bid Proposal Forms, which are detached from specifications, will be considered and will have the same force and effect as if attached thereto. Numbers shall be stated both in writing and in figures for the Base Bids and Alternates.

Any modification to the Bid Proposal Forms (including Alternates and/or Unit Prices) may disqualify the Bid and may cause the Bid to be rejected.

The Contractor shall fill in the Bid Proposal Forms as follows:

- A. 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.
- B. 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.
- C. 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 the title of the office of such person shall appear after their signatures. The seal of the Corporation shall be impressed on each signature page of the documents.
- D. If the Proposal is made by a Joint Venture, it shall be executed by each member of the Joint Venture in the above form for sole Owner, Partnership, or Corporation, whichever form is applicable.
- E. All signatures shall be properly witnessed or attested as applicable.
- F. Each proposal shall be addressed as indicated in the Advertisement for Bids and shall be delivered, enclosed in an opaque sealed envelope, marked "Proposal" and bearing the name of Project, name and address of the Bidder, the Bidder's license number and, if applicable, the designated portion of the Work for which Bid is submitted.

- G. It shall be the specific responsibility of the Bidder to deliver the Bid to the proper official at the appointed place and prior to the announced time for the opening of Bids. Later delivery of a Bid for any reason, including delivery by the United States Mail, shall disqualify the Bid.
- H. Modifications of previously deposited Bids or requests for withdrawal will be acceptable only if delivered in person or in writing to the place of the Bid opening prior to the time for opening Bids.
- I. Unit Prices quoted in the Proposal shall include overhead and profit and shall be the full compensation for the Contractor's cost involved in the work.
- J. All Bidders shall submit, attached to the bid, evidence of compliance with the Owners Minority Business Enterprise Program as outlined in Section 005500, Minority Business Enterprise Documents, of the Project Manual.

## 2. REQUIREMENTS FOR DOCUMENTING MINORITY BUSINESS PARTICIPATION

- A. Documentation to be submitted with each bid proposal
  - 1. All Bidders must provide, with the bid, Wake County Form MBE –1 (2002), Identity of Minority Business Participation, which identifies the minority businesses that will be used on the project, with the total dollar value of the work that will be performed by the listed minority businesses. Wake County Form MBE –1 (2002), Identity of Minority Business Participation, is a part of the bid form.
  - 2. All Bidders must provide, with the bid, one of the following:
    - a. Wake County Form MBE –2 (2002) – a listing of the good faith efforts made to solicit minority participation in the bid effort. A bidder must earn a minimum of 50 points from the good faith efforts listed for their bid to be considered responsive or;
    - b. Wake County Form MBE –3 (2002) – This form is to be submitted only by bidders certifying that all the work on the project will be performed 100% by their own workforce.

**All bidders must submit with their bid the applicable forms; failure to submit the required forms may be grounds for rejection of the bid.**

- B. Documentation to be submitted by the apparent low bidder after notification by the Owner

After the bid opening the Owner will consider all bid proposals and then determine and contact the apparent lowest responsible, responsive bidder. Within 72 hours of receipt of notification of being the apparent lowest responsible, responsive Bidder the Bidder shall submit the following:

1. If the Bidder's minority business participation meets or exceeds the established goal of 10%, the Bidder must submit Wake County Form MBE-4 (2002). This form is to include a description of the portion of work to be executed by minority business, expressed as a percentage of the total contract price.
2. If the Bidder's minority business participation is less than the established goal of 10%, the Bidder must submit Wake County Form MBE - 5 (2002). This form is to document the Bidder's good faith efforts to meet the established goal. Documentation to be provided on this form shall be evidence of all good faith efforts made, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority business for participation in the contract.

C. Other documentation to be provided after contract award

1. Within 30 days after a contract is awarded, or sooner if required by the Contract Documents, the successful Bidder must provide, to the Owner, a list of all subcontractors to be used on the project. The list must identify the minority category of each minority subcontractor.
2. With the final request for payment the successful Bidder shall provide a complete listing of all minority businesses used on the project, along with the total dollar value of work performed by each minority business. This information must be provided on Wake County Form MBE- 6 (2002).

### 3. EXAMINATION OF CONDITIONS

It is understood and mutually agreed that by submitting a Bid the Contractor acknowledges his careful examination of the Bidding Documents pertaining to the work, the location, accessibility and general character of the site of the work and all existing buildings and structures within and adjacent to the site; and has satisfied himself as to the nature of the work, the condition of existing buildings and structures, the conformation of the ground, the character, quality and quantity of the materials to be encountered; the character of the equipment, machinery, plant and any other facilities needed preliminary to and during prosecution of the work; the general and local conditions; the construction hazards; and all other matters, including but not limited to, the labor situation which can in any way affect the work under the Contract; and

including all safety measures required by the latest edition of the Occupational Safety Health Act and all rules and regulations issued pursuant thereto. It is further mutually agreed that by submitting a Proposal, the Contractor acknowledges that he has satisfied himself as to the feasibility and meaning of the plans, drawings, specifications, and other Contract Documents for the construction of the work and that he accepts all the terms, conditions and stipulations contained therein; and that he is prepared to work in cooperation with the Owner and all other Contractors performing work on the site.

Reference is made to the Contract Documents for the identification of those surveys and investigative reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by the Licensed Professional who prepared the documents. Copies of all such surveys and reports are available to the Bidders, upon request. All Bidders are responsible for reviewing these documents prior to submission of their Bid Proposal.

Each Bidder may, at his own expense, make such additional surveys and investigations, as he may deem necessary to determine his Bid price for the performance of the work. Any on-site investigation shall be done at the convenience of the Owner. The Owner will honor any reasonable request for access to the site.

#### 4. SUBSTITUTIONS

Material substitutions will be considered during the bidding phase until seven (7) days prior to the receipt of bids. No substitutions will be considered after seven (7) days prior to the receipt of Bids.

For proposed material substitutions submit the following information to the Licensed Professional who prepared the bidding documents:

- Name of manufacturer
- Address of manufacturer
- Phone number of manufacturer
- Trade name
- Model or catalogue designation
- Manufacturer's data including:
  - Performance and test data
  - Reference standards
- Detailed comparison with specified product including:
  - Performance
  - Test results
  - Warranties
  - Gauge, thickness or strength or material
  - Finish
  - Other pertinent data

Other information requested by the Licensed Professional who prepared the bidding documents

Submittals relating to substitutions, which are not fully complete by seven (7) days prior to the receipt of bids, will not be reviewed.

If the Licensed Professional who prepared the bidding documents accepts a material substitution, Contractors will be notified by Addendum.

## 5. ADDENDA

Any Addenda to bidding documents issued during the time of bidding will be sent to each Bidder, and are to be considered covered in the Bid Proposal. It is the Contractor's responsibility to ascertain prior to Bid time, which Addenda have been issued and confirm that his Bid Proposal includes any changes covered by the Addenda.

Should the Bidder find discrepancies in, or omissions from, the drawings or documents or should he be in doubt as to their meaning, he shall at once notify the Licensed Professional who prepared said drawings or documents. Neither the Owner nor the Licensed Professional who prepared the bidding documents will be responsible for any oral instructions.

The Bidder on his Bid Proposal shall acknowledge all Addenda. Failure to do so may disqualify the Bid and may cause the Bid to be rejected.

## 6. BID SECURITY

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, or a Bid Bond in an amount equal to not less than five percent (5%) of the Proposal. Said deposit to be retained by the Owner (referred to as Obligee on the Bond Form) as liquidated damages in event of failure of the successful Bidder to execute the Contract within ten (10) days after the award or to give satisfactory Surety as required by law.

The Bid Bond shall be conditioned that the surety will, upon demand, forthwith make payment to the Owner (referred to as Obligee on the Bond Form) upon the said bond if the Bidder fails to execute the contract.

## 7. RECEIPT OF BIDS

Bids and Bid Security shall be received in strict accordance with requirements of the North Carolina General Statutes. Prior to opening of any Bids on the Project, the

Bidder will be permitted to change or withdraw his Bid as allowed by Item 1-H of these Instructions.

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

#### 8. OPENING OF BIDS

Upon opening, all Bids shall be read aloud. Once any Bid is opened, the Owner may return no Bids to any Bidder.

After Bids are opened, a Bidder may request that his Bid be withdrawn without forfeiting his Bid deposit in certain limited circumstances. Withdrawal after opening is permitted only if all of the following conditions specified in North Carolina General Statutes §143-129.1 are met:

- A. The Bid was submitted in good faith.
- B. The price Bid "was based upon a mistake, which constituted a substantial error".
- C. Credible evidence is submitted showing that the error (1) was clerical in nature, as opposed to a judgment error; and (2) was actually due to an unintentional and substantial arithmetic error or an unintentional omission of a substantial quantity of work, labor, material or services made directly in the compilation of the Bid.
- D. The error can be clearly shown by objective evidence drawn from inspection of the original work papers, documents, or materials used in the preparation of the Bid.
- E. The request to withdraw (1) is made in writing to the public agency that invited the Proposals, and (2) is made prior to the award of the Contract, but not later than seventy-two (72) hours after the opening of Bids.

#### 9. REJECTION OF BIDS

The Owner reserves the unqualified right to reject any and all Bids. Reasons for rejection may include, but shall not be limited to, the following:

- A. If the Form of Proposal furnished to the Bidder is not used or is altered.
- B. If the Bidder fails to insert a price for all Bid items, Alternates and Unit Prices requested.
- C. If the Bidder adds any provisions reserving the right to accept or reject any award.
- D. If there are unauthorized additions or conditional Bids, or irregularities of any kind which tend to make the Proposal incomplete, indefinite, or ambiguous as to its meaning.
- E. If the Bidder fails to complete the Proposal forms where information is requested so the Bid may be properly evaluated by the Owner.
- F. If the Unit Prices contained in the Bid Schedule are unacceptable to the Owner.
- G. If the Bidder fails to comply with other instructions stated herein.
- H. If the Bidder fails to provide all documentation confirming compliance with the Wake County Minority Business Enterprise Program.

#### 10. BID EVALUATION

The award of the Contract will be made to the lowest responsible Bidder as soon as practical. Should the successful Bidder default and fail to execute a Contract, the Contract may be awarded to the next lowest and responsible Bidder.

Before awarding a Contract, the Owner may require the apparent low Bidder to qualify himself to be a responsible Bidder by furnishing any or all of the following data:

- A. The latest financial statement showing assets and liabilities of the company or other information satisfactory to the Owner.
- B. A listing of similar completed projects of similar size, with contact persons and telephone numbers.
- C. Permanent name and address of place of business.
- D. The number of regular employees of the organization and length of time the organization has been in business under present name and percentage of work typically performed by the contractor's firm.

(1) Qualifications of key employees assigned to this Project.



(2) References for key employees assigned to this Project.

- E. The name and home office address of the Surety proposed and the name and address of the responsible local claim agent.
- F. The names of members of the firm who hold appropriate trade licenses, together with license numbers.
- G. Complete list of all subcontractors and suppliers proposed.
- H. Any pending arbitration or mediation cases or lawsuits. This may include all arbitration, mediation and lawsuits settled or resolved within last ten (10) years.

Failure or refusal to furnish any of the above information if requested shall constitute a basis for disqualification of any Bidder.

In determining the lowest responsible Bidder, the Owner may consider the past performance of the Bidder on construction contracts for the County of Wake, Wake County Public School System, the State of North Carolina or other governmental agencies. Particular concern will be given to completion times, quality of work, cooperation with other Contractors, and cooperation with the Designer and Owner.

Should the Owner adjudge that the apparent low Bidder is not the lowest "responsible" Bidder by virtue of the above information, said apparent low Bidder will be so notified and his Bid Security shall be returned to him.

The Owner shall have the right to accept Alternates in any order or combination and to determine the low Bidder on the basis of the sum of the Base Bid and the Alternates accepted.

The Owner reserves the right to reject any and all Bids, to waive all technicalities and irregularities, and to make the award as considered to be in the best interest of the Owner.

#### 11. PERFORMANCE BOND

The successful Bidder, upon award of Contract, shall furnish a Performance Bond in an amount equal to one hundred percent (100%) of the Contract price.

#### 12. PAYMENT BOND

The successful Bidder, upon award of Contract, shall furnish a Payment Bond in an amount equal to one hundred percent (100%) of the Contract price

13. PRE-BID CONFERENCE

Bidders are requested to attend a Pre-Bid Conference at the time and place stipulated in the Bidding Documents.

14. PROPOSALS TO BE BID

General Construction Work

15. INFORMATION TO BIDDER

All questions concerning the plans and specifications should be directed to the Licensed Professional who prepared said documents.



## **Facilities Design & Construction**

☎ 919 856 6350  
☎ 919 856 6355

**Waverly F. Akins Wake County Office Building**  
P.O. Box 550 • Raleigh, NC 27602  
336 Fayetteville St., Room 1100 • Raleigh, NC 27601  
wake.gov

### **Notice of Wake County Electronic Contracting Processes for Construction Agreements**

All Wake County contracts are now executed and processed electronically. The successful lowest responsive responsible bidder upon award of the construction contract must be a registered Wake County vendor to start the electronic contract process. Any company not registered as a Wake County vendor must register. The County will contact the low bidder and offer instructions on how to register as a vendor or update their existing vendor registration info if needed.

Upon notification of contract award, contractor will be issued instructions for processing Performance and Payment Bonds, Certificates of Insurance, and issuance of the Construction Agreement

Contracts will then be transmitted via DocuSign for signing, attesting, and execution.



Wake County Office Building – 12th & 14<sup>th</sup> Floors Upfit  
RFB #25-021

**BID PROPOSAL FORM**

**(USE THIS FORM ONLY. Bids submitted on anything other than the form(s) provided may be considered non-responsive and subject to rejection)**

SINGLE PRIME GENERAL CONSTRUCTION WORK  
FORMAL CONTRACT

BIDDERS NAME

\_\_\_\_\_ License Number: \_\_\_\_\_

BASE BID PROPOSAL

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 informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the specifications for the work and the Contract Documents relative thereto, including addenda, if any, 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 proposes and agrees if this Proposal is accepted to contract with the County of Wake with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and Contract Documents, for the sum of:

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

SUBCONTRACTOR LISTING

PLUMBING CONTRACTOR

Name: \_\_\_\_\_ License Number: \_\_\_\_\_

\$ \_\_\_\_\_

HVAC CONTRACTOR

Name: \_\_\_\_\_ License Number: \_\_\_\_\_

\$ \_\_\_\_\_

ELECTRICAL CONTRACTOR

Name: \_\_\_\_\_ License Number: \_\_\_\_\_

\$ \_\_\_\_\_

FIRE ALARM CONTRACTOR

Name: \_\_\_\_\_ License Number: \_\_\_\_\_

\$ \_\_\_\_\_

FIRE SUPPRESSION CONTRACTOR

Name: \_\_\_\_\_ License Number: \_\_\_\_\_

\$ \_\_\_\_\_

ALTERNATES

Should any of the alternates as described in the specifications be accepted, the amount written below shall be the amount to "add to" of "deduct from" the Base Bid. If to be "deducted from" Base Bid, put minus sign (-) in parentheses at head of alternate and plus sign (+) in parentheses if to be added. Refer to Section 01 2300 for description of alternates.

Preferred Brand Alternate No. 1: Mechanical Locksets \_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

Preferred Brand Alternate No. 2: Electromechanical Locksets \_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

Preferred Brand Alternate No. 3: Electromechanical Exit Devices \_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

Preferred Brand Alternate No. 4: Cylinders \_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

## UNIT PRICES

Unit prices are complete for labor, equipment, material, overhead and profit. Base bid includes the stipulated allowance quantity of each item. Unused amount will be credited to the Owner by change order at the end of the project.

Description	Unit Price	Unit Measure	Allowance Units
Wall and Ceiling Exit Signs		Each	
Fire Alarm Speaker/Strobe		Each	
Duplex/Quad Receptacle		Each	
Sprinkler Head		Each	
Data Drop		Each	
Plaster Patching		SF	20

## ALLOWANCES

Allowances indicated herein below shall be included in the Base Bid. See Section 01 2100 "Allowances."

- A. Allowance No. 1 – Lump-Sum Allowance: Include the sum of \$35,000.00 for voice/data.
- B. Allowance No. 2 – Lump-Sum Allowance: Include the sum of \$80,000.00 security installation.
- C. Allowance No. 3 – Lump-Sum Allowance: Include the sum of \$15,500.00 for the F10 carpet tile.
- D. Allowance No. 4 – Lump-Sum Allowance: Include the sum of \$15,900.00 for the F20 carpet tile.
- E. Allowance No. 7 – Lump-Sum Allowance: Include the sum of \$7,000.00 for the F30 carpet tile.
- F. Allowance No. 5 – Lump-Sum Allowance: Include the sum of \$1,500.00 for the F40 floor tile.
- G. Allowance No. 6 – Lump-Sum Allowance: Include the sum of \$2,900.00 for the F50 VCT.
- H. Allowance No. 8 – Lump-Sum Allowance: Include the sum of \$2,500.00 for the B40 base tile.
- I. Allowance No. 9 – Lump-Sum Allowance: Include the sum of \$6,200.00 for the W30 wall tile.
- J. Allowance No. 10 – Lump-Sum Allowance: Include the sum of \$9,000.00 for the W40 mosaic tile.
- K. Allowance No. 11 – Unit-Cost Allowance: Plaster Patching.
  - a. Coordinate adjustment with the corresponding unit-price requirements in Section 01 2200 "Unit Prices".
  - b. Allowance Quantity: 20 SF.

MINORITY BUSINESS PARTICIPATION REQUIREMENTS; 143.128.2.c

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**Provide with the bid** - Under GS 143-128.2(c) the bidder shall identify and include **with the bid, Wake County Form MBE-1 Identity of Minority Business Participation**, 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. **All bidders must submit, with the bid, Wake County Form MBE-1 Identity of Minority Business Participation Form even if there is zero MBE participation.**

**Also include with the bid** a list of the good faith efforts made to solicit minority participation in the bid effort, **Wake County Form MBE-2 Listing of the Good Faith Effort.**

**NOTE:** A contractor that performs all of the work with its own workforce may submit **Wake County Form MBE-3-Intent to Perform Contract with Own Workforce**, to that effect in lieu of **Wake County Form MBE-2-Listing of the Good Faith Effort.**

**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 lowest responsible, responsive bidder, the bidder must then file within 72 hours of the notification **Wake County Form MBE-4.** It includes that portion of the Work to be Performed by Minority Business. Also included is 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 **Wake County Form MBE-5** is not necessary,

**OR**

If less than the 10% goal, **Wake County Form MBE-5** documenting all good faith efforts 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 project.

**Note:** Bidders must always submit **with their bid** the Identification of Minority Business Participation Form listing all MBE contractors, vendors, and suppliers that will be used. If there is no MBE participation, then enter none or zero on the form. **Wake County Form MBE-2** or **Wake County Form MBE-3** as applicable must also be submitted with the bid. Failure to submit a required affidavit or form with the bid or within the time required may be grounds for rejection of the bid.



# Attach to Bid Form

## WAKE COUNTY FORM MBE-1 (2002) IDENTIFICATION OF MINORITY BUSINESS PARTICIPATION FORM

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

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

Firm Name, Address, Phone No.	Work Type	Minority Category

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

The total value of minority business contractors will be \$ \_\_\_\_\_.

**Attach to Bid Form  
Wake County – Form MBE-2 (2002)  
Listing of the Good Faith Effort**

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

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 inter 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 GS 143-128.2(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 North Carolina, County of \_\_\_\_\_  
Subscribed and sworn to before me this \_\_\_ day of \_\_\_\_\_ 20\_\_  
Notary Public \_\_\_\_\_  
My commission expires \_\_\_\_\_

**Attach to Bid Only If Bidder Performs All Work With Own Workforces**

**Wake County Form MBE-3 (2002)**  
**Intent to Perform Contract with Own Workforce**

Affidavit of

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

I hereby certify that it is our intent to perform 100% of the work required for the project

\_\_\_\_\_  
(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 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 North Carolina, County of \_\_\_\_\_

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

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

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

CERTIFICATION OF PROPOSER:

The Bidder further proposes and agrees hereby to commence work under his Contract on a date to be specified in a written order of Wake County and shall fully complete all work thereunder within the number of consecutive calendar days stipulated in the Supplementary General Conditions. Applicable liquidated damages shall be as stated in Supplementary General Conditions.

The undersigned acknowledges receipt of the following addenda issued during the time of bidding and includes the changes therein in this Proposal:

Addendum Number \_\_\_\_\_, Dated \_\_\_\_\_

Addendum Number \_\_\_\_\_, Dated \_\_\_\_\_

Addendum Number \_\_\_\_\_, Dated \_\_\_\_\_

The undersigned agrees that this Proposal will not be withdrawn for a period of sixty (60) days.

The undersigned agrees to comply with the E-Verify requirements of the General Statutes of North Carolina, all contractors, including any subcontractors employed by the contractor(s), by submitting a bid, proposal or any other response, or by providing any material, equipment, supplies, services, etc., attest and affirm that they are aware and in full compliance with Article 2 of Chapter 64, (NCGS64-26(a)) relating to the E-Verify requirements.

The undersigned agrees not to discriminate in any manner on the basis of race, natural hair or hairstyles, ethnicity, creed, color, sex, pregnancy, marital or familial status, sexual orientation, gender identity or expression, national origin or ancestry, marital or familial status, pregnancy, National Guard or veteran status, religious belief or non-belief, age, or disability with reference to the subject matter of this Contract. The Parties agree to comply with the provisions and intent of Wake County Ordinance SL 2017-4. This anti-discrimination provision shall be binding on the successors and assigns of the Parties with reference to the subject matter of this Contract.

The undersigned further agrees that in the case of failure on his part to execute the said Contract and the Bond within ten (10) consecutive calendar days after written notice being given of the award of the Contract, the check, cash or Bid Bond accompanying this Bid shall be paid into the funds of Owner's Account set aside for this Project, as liquidated damages for such failure; otherwise the check, cash or Bid Bond accompanying this Proposal shall be returned to the undersigned.

Respectfully submitted this \_\_\_ day of \_\_\_\_\_, 20\_\_

**PROPOSER SIGNATURE PAGE**

\_\_\_\_\_  
(Name of Firm or Corporation making Bid)

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

WITNESS:

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

Title: \_\_\_\_\_  
(Owner, Partner, or Corporation  
President or Vice President only)

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

License Number: \_\_\_\_\_



Affix Corporate Seal Above

ATTEST:

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

Title: \_\_\_\_\_  
(Corporation Secretary or Assistant Secretary only)



**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, that we, \_\_\_\_\_,

(Bidder's Name)

\_\_\_\_\_, of \_\_\_\_\_

(Street Address)

(City, State, Zip)

hereinafter called the Principal, and \_\_\_\_\_ of

(Surety's Name)

\_\_\_\_\_, a Corporation duly organized, and existing under the laws of the State of \_\_\_\_\_ and authorized to transact business in the State of North Carolina, as Surety, hereinafter called the Surety, are held and firmly bound unto the County of Wake as Owner, hereinafter called the Obligee, in the Penal sum of five percent (5%) of the amount bid, good and lawful money of the United States of America, for the payment for which the Principal and the Surety, bind ourselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents. This bid bond is submitted in lieu of submitting cash, a cashier's check, or a certified check pursuant to G.S. 143- 129.

WHEREAS, the Principal has submitted a Bid for the renovation of **Wake County Office Building = 12<sup>th</sup> & 14<sup>th</sup> Floors Upfit.**

NOW THEREFORE, if the Obligee shall accept the Bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of said Bid, and give such bond or bonds as may be specified in the Bidding and Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and materials furnished in the prosecution thereof, then this obligation shall be null and void; but if the Principal fails to so execute such Contract and give such bonds as required by G.S. 143-129, this obligation shall otherwise remain in full force and effect and the Surety shall, upon demand, forthwith pay to the Obligee the full amount set forth in the first paragraph hereof.

SIGNED AND SEALED this \_\_ day of \_\_\_\_\_, 20\_\_ in the presence of:

Witness \_\_\_\_\_

Witness \_\_\_\_\_

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

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title





**PART 1 – WAKE COUNTY MINORITY AND WOMEN BUSINESS ENTERPRISE RESOLUTIONS  
FOR CONSTRUCTION CONTRACTS  
ORIGINAL RESOLUTION FEBRUARY 29, 1988**

**1.1 R-02-52**

**RESOLUTION UPDATING WAKE COUNTY PROCEDURES  
AND POLICIES RELATING TO COUNTY CONSTRUCTION PROJECTS AWARDED  
PURSUANT TO N.C.G.S. §143-128 ET SEQ.**

WHEREAS, the North Carolina General Assembly has recently amended Article 8 of N.C.G.S. Chapter 143, Public Contracts, to increase the threshold for public contracts which must be bid, and to make other changes related to construction methods, construction management and minority business participation, and

WHEREAS, Wake County has adopted resolutions directing the County Manager to prepare and maintain minority and women business enterprise programs for all construction projects funded by Wake County (R-88-20) and establishing a verifiable percentage goal for minority business in awarding construction contracts the costs of which exceed one hundred thousand dollars (\$100,000) (R-90-13), and

WHEREAS, recent amendments to N.C.G.S. §143-129(a) have increased the threshold amount of public construction contract which must be bid from one hundred thousand dollars (\$100,000) to three hundred thousand dollars (\$300,000), and

WHEREAS, N.C.G.S. §143-128(a1) has increased the permissible methods that public bodies may use in awarding construction contracts, and

WHEREAS, N.C.G.S. §143-128.2 now requires more extensive efforts and detailed record keeping related to minority business participation in construction projects,

NOW, THEREFORE, BE IT RESOLVED by the Wake County Board of Commissioners

Section 1. That Resolutions R-90-13 and R-88-20 be amended to provide that the County Manager be directed to establish policies and procedures for bidding and awarding County building projects which comport with the requirements of Article 8 of N.C.G.S. Chapter 143, Public Contracts, as it is from time to time amended, and which are consistent with the policies contained in those Resolutions.

**1.2 R-90-13**

**RESOLUTION TO ESTABLISH A VERIFIABLE PERCENTAGE GOAL FOR PARTICIPATION BY MINORITY BUSINESS IN THE AWARDING OF BUILDING CONSTRUCTION CONTRACTS AWARDED PURSUANT TO N.C.G.S. §143-128**

WHEREAS, N.C.G.S. §43-128(c) requires each county to adopt, after notice and a public hearing, an appropriate verifiable percentage goal for participation by minority businesses (as defined in that statute) in the total value of work for building contracts the costs of which exceed one hundred thousand dollars (\$100,000) and which are awarded pursuant to N.C.G.S. §143-128; and

WHEREAS, N.C.G.S. §143-128(c)(3) requires a county awarding a building contract the cost of which exceeds one hundred thousand dollars (\$100,000) under a separate prime or separate specification contract system to adopt written guidelines specifying actions that will be taken by the county to ensure a good faith effort in the recruitment and selection of minority businesses for building contracts awarded under the separate prime or separate specification contract system; and

WHEREAS, N.C.G.S. §143-128(c)(4) requires a county awarding a building contract the costs of which exceeds one hundred thousand dollars (\$100,000) under a single-prime contract system to adopt written guidelines specifying the action that the prime contractor must take to ensure a good faith effort in the recruitment and selection of minority businesses for building contracts awarded under the single prime contract system; and requires that action taken by the prime contractor must be documented in writing by the contractor to the County; and

WHEREAS, N.C.G.S. §143-128(b) requires that a county choosing to use a single-prime contract system must also seek bids for a building contract the cost of which exceeds one hundred thousand dollars (\$100,000) under a separate prime or separate specification contract system and must award such building contract to the lowest responsible bidder or bidders for the total project; and

WHEREAS, N.C.G.S. §143-128(d) requires the county to award public building contracts the costs of which exceed one hundred thousand dollars (\$100,000) without regard to race, religion, color, creed, national origin, sex, age or handicapping condition; and

WHEREAS, notice of the public hearing was duly published and the public hearing required by N.C.G.S. §143-128(c) was held February 19, 1990;

NOW THEREFORE, BE IT RESOLVED BY the Wake County Board of Commissioners

Section 1. That Wake County shall have a verifiable goal of ten percent (10%) for participation by minority businesses in building construction contracts awarded pursuant to N.C.G.S. §143-128.

Section 2. That for each such building contract put out for bids under the separate specification or the single prime contract systems, notice of the contract shall be transmitted to the Minority Business Development Agency in Raleigh, North Carolina and the North Carolina Institute of Minority Economic Development in Durham, North Carolina (hereinafter "minority agencies").

Section 3. That for each such building contract put out for bids under the separate specification or single prime contract systems, documents related to the contract shall be available for inspection at a convenient and accessible location of which minority agencies shall receive notice.

Section 4. That for any such building contract put out for bids under the separate specification contract system, the County shall maintain records with respect to:

- a. those contractors or subcontractors that bid or otherwise respond to notice of the project,
- b. those contractors or subcontractors awarded contracts as part of the project, and
- c. the percentage of work on the project that is to be performed by minority businesses.

Section 5. That for any such building contract put out for bids under the single prime contract system, the single prime contractor shall:

- a. notify appropriate minority businesses of the portion of the project which will be subcontracted by the single contractor and solicit bids from those minority agencies.
- b. submit with his bids records with respect to:
  1. those minority subcontractors notified of the project and of those elements of the project for which subcontracts will be let, and
  2. those minority subcontractors that bid or otherwise respond to notice of the project, and
  3. those minority subcontractors awarded contracts as part of the project, and
  4. the percentage of work on the project that is to be performed by minority businesses.

Section 6. That these policies shall be a part of the request for proposals for any such contract, and noncompliance by any single prime bidder shall be grounds for declaring the bid non-responsive.

Section 7. The County Manager is hereby authorized to impose additional requirements, not inconsistent with the requirements of this resolution and pursuant to the resolution of this Board enacted February 28, 1988, the purposes of which are to promote the goal and intent of this resolution.

Commissioner Heater moved the adoption of the foregoing resolution. Commissioner Ward seconded the motion and, upon vote, the motion passed unanimously this the 19th day of February, 1990.

**1.3 R-88-20**

**WAKE COUNTY, NORTH CAROLINA MINORITY AND WOMEN BUSINESS ENTERPRISE RESOLUTION FOR CONSTRUCTION CONTRACTS**

WHEREAS, the Board of County Commissioners of Wake County, North Carolina desires that all segments of the population of Wake County have equal opportunity to compete for contracting and subcontracting work offered by the County; and

WHEREAS, it is in the best interest of Wake County to develop and maintain as large a pool of qualified, prospective contractors to draw upon as possible;

WHEREAS, it is the judgment of the Wake County Board of Commissioners that the County has a compelling interest to implement a minority/women business enterprise program to ensure the representative participation of all segments of the population in the County's economy; and

NOW, THEREFORE, BE IT RESOLVED that the Board of County Commissioners of Wake County declares that it is their policy to provide minorities and women equal opportunity to participate in all aspects of the County's construction program consistent with Chapter 143, Article 8 of the General Statutes of the State of North Carolina.

BE IT FURTHER RESOLVED that the Board of Commissioners of Wake County hereby directs the County Manager to prepare and maintain a minority and women business enterprise program for all construction projects funded by the County.

Upon motion of Commissioner Stout, seconded by Commissioner Zieverink, and upon roll call vote, the Board adopted the above resolution this 29<sup>th</sup> day of February 1988

## **PART 2 – MINORITY BUSINESS ENTERPRISE PARTICIPATION IN WAKE COUNTY BUILDING CONSTRUCTION AND REPAIR CONTRACTS**

### **2.1 POLICY STATEMENT**

It is the policy of the County to encourage minorities to participate in its building construction, renovation and repair projects.

It is further the policy of the County to prohibit illegal discrimination against any person or business enterprise and to conduct its building construction, renovation and repair programs so as to prevent such discrimination.

It is the policy of the County in concert with other local, state and federal agencies and with the assistance of minority groups and agencies, to seek and identify qualified minority business enterprises (MBEs) and to offer them the opportunity to participate, and to encourage them to participate, in the County's building construction and repair programs. Under this policy, the County adopts the definition of MBEs contained in N.C.G.S. § 143-128.2.

It is the policy of the County to provide information and opportunities to minority business enterprises that are available to other business enterprises, and to establish procedures providing MBEs access to information and opportunities available to other business enterprises.

It is the intent of this policy to secure contractors' participation and ensure competition. Nothing in this policy shall be construed to require contractors or the County to award contracts or subcontracts 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.

The County will award public building construction and repair contracts to the lowest responsible, responsive bidder as provided by Article 8 of Chapter 143 of the North Carolina General Statutes.

### **2.2 SCOPE: This Policy Applies To Minority Business, Minority Persons, and Socially and Economically Disadvantaged Individuals. [Ref: N.C.G.S. §143-128.2(g)]**

#### **A. A Minority Business (MBE) is a business:**

1. In which at least fifty-one percent (51%) is owned by one or more minority persons or socially and economically disadvantaged individuals, 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

2. 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.
- B. A Minority Person<sup>1</sup> is a person who is a citizen or lawful permanent resident of the United States, and who is:
1. Black, that is, a person having origins in any of the black racial groups in Africa;
  2. 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;
  3. 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;
  4. American Indian or Alaskan Native, that is, a person having origins in any of the original peoples of North America; or
  5. Female.
- C. A Socially and Economically Disadvantaged Individual is defined by 15 U.S.C. 637 as a socially disadvantaged individual 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. In determining the degree of diminished credit and capital opportunities, the federal government considers factors such as assets and net worth. This category includes members of economically disadvantaged Indian tribes.

## **2.3 VERIFIABLE GOALS FOR MINORITY BUSINESS ENTERPRISE PARTICIPATION<sup>2</sup>**

- A. County Funded Building Construction or Repair Projects costing \$5000 or more.
1. The County has established a verifiable goal of ten percent (10%) for participation by minority businesses in building construction and repair projects covered by this section. [Ref: N.C.G.S. §143-128.2 (a)]
- B. For Building Construction or Repair Projects Using State Appropriations or Other State Grant Funds Where the Project Cost is Equal to or Greater than One Hundred Thousand Dollars (\$100,000), the County shall use the State's verifiable goal of ten percent (10%) for participation by minority business in building construction and repair projects covered by this section. [Ref: N.C.G.S. §143-128.2 (a)]

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<sup>1</sup> For building projects funded in whole or in part with federal funds, Hasidic Jews are also considered minority persons.

<sup>2</sup> Projects funded in whole or in part with federal funds will comply with applicable federal thresholds regarding Minority and Woman Owned Business Enterprises participation.

## **PART 3 – REGULATIONS AND PROCEDURES FOR IMPLEMENTING MINORITY BUSINESS ENTERPRISE PARTICIPATION POLICY**

**3.1 INFORMAL BUILDING PROJECTS:** Building construction and repair projects costing more than Five Thousand Dollars (\$5,000), but less than Three Hundred Thousand Dollars (\$300,000).

### **A. County Responsibilities:**

1. Notify Minority Business Enterprises of bidding opportunities by one of the following methods:
  - a) Advertise the project at the Raleigh/Durham/Triad Minority Business Development Center or similar institution, or;
  - b) Advertise the project in an identified Minority Business Enterprise targeted newspaper(s) or;
  - c) Attempt to contact Minority Business Enterprises totaling at least 30% of the total number of vendors contacted [Ref.: N.C.G.S. §143-129. (b)]
2. Record all contractors contacted, along with the list of contractors provided with bidding documents.
3. Identify Minority Business firms contacted and record their minority category.
4. Record all contractors submitting bids, along with the amount of each bid.
5. Within five (5) days of project completion, submit a completed “Informal Construction Project Report Form” to the Wake County Finance Department.
6. The Wake County Finance Department will collect store, and report data and forms referenced in this Section 00600. See Section 3.3

### **B. Contractor Responsibilities:**

1. The Contractor will provide the following documentation, Wake County Form MBE-6, at contract closeout and prior to final payment by the county.
  - a) A list of minority business’s used on the project, identifying the businesses name, type of work performed, and minority category.
  - b) List the dollar amount paid to each minority business and the percentage it represents of the final project value.

3.2 **FORMAL BUILDING PROJECTS:** Building construction and repair projects costing Three Hundred Thousand Dollars (\$300,000) or more.

A. County Responsibilities:

1. Advertise Building Projects. When soliciting bids for formal building construction and repair projects, the county must
  - a) Advertise or post notice of bid opportunities to MBE and other potential bidders in trade publications (or whatever it is that we use now) and MBE targeted publications, plans review rooms or newspaper(s) with general circulation at least fourteen (14) days prior to the scheduled bid opening date. [Ref: N.C.G.S. §143-128.2(e)(3)]
  - b) Include the following in each advertisement or notice published: (i) a description of the work for which the bid is being solicited; (ii) the date, time, and location where bids are to be submitted; (iii) the name of the individual within the public entity who will be available to answer questions about the project; (iv) where bid documents may be reviewed; (v) notice of the date, time, and location of the prebid conference. [Ref: N.C.G.S. §143-128.2(e)(3)]
2. Hold a prebid conference prior to bid opening for each project and assure a County representative is in attendance. [Ref: N.C.G.S. §143-128.2(e)(2)]
3. Allow contractors to obtain, at least 10 days before the bid date, a complete set of Bidding Documents by providing a refundable deposit as outlined in the project Advertisement or published notice. Deposits will be refunded as stipulated in the Bidding Documents. [Ref: N.C.G.S. §143-128.2(e)(2)]
4. Include in the bidding documents for each project the following forms and a statement that all contractors submitting bids must include all applicable forms, fully completed, and that failure to file required forms with bids may be grounds for rejection of the bid. [Ref: N.C.G.S. §143-128.2. (c)(1)b.]
  - a) Wake County Form MBE-1, identifying minority business participation;
  - b) Wake County Form MBE-2, affidavit listing contractor's good faith efforts to meet the 10% goal for MBE participation, including any advertisements, solicitations, and evidence of other specific actions to recruit minority businesses for participation in the project;
  - c) Wake County Form MBE-3, affidavit evidencing contractor's intent to perform all contract work with its own workforce; and
  - d) A copy of the County's MBE policy and procedures.



5. Maintain all public records created for each project, including all records and documentation relating to MBE procedures, for a period of three years from the date of project completion. See Section 3.3. [Ref: N.C.G.S. §143-128.2(i)]
6. In any building or repair project financed in whole or in part with federal funds, the County must include a statement that all federal guidelines associated with the source of the federal funds must be complied with. For example, projects funded by HUD must comply with all requirements of 24 CFR §135.

## **B. Contractor Responsibilities:**

1. All bidders on formal building construction or repair projects shall undertake a good faith effort to recruit minority businesses and provide documentation of meeting the minimum requirements of N.C. Gen. Stat. § 143-128.2.
  - a) Failure to comply with these procedural requirements and requirements for submittal of information in the Request for Proposals may render the bid non-responsive and may result in rejection of the bid. [Ref: N.C.G.S. §143-128.2.(c)(1)]
  - b) All contractors, including first-tier subcontractors on construction manager at risk projects, that do not propose to do all of the contract work with their own workforce must advertise for minority subcontractor, vendors and suppliers at least ten days prior to submission of the contractor's bid. [Ref: N.C.G.S. §143-128.2.(f)(1)]
2. Each bidder, including first-tier subcontractors for construction manager at risk projects, must submit a completed Wake County Form MBE-1 and Wake County Form MBE-2. A contractor, including a first-tier subcontractor on a construction manager at risk project, that performs all of the work under a contract with its own workforce may submit a Wake County Form MBE-3 in lieu of Wake County Form MBE-2 otherwise required under this subsection. [Ref: N.C.G.S. §143-128.2.(c)]
3. The apparent lowest responsible, responsive bidder, must submit the following documents within 72 hours after notification of being the low bidder:
  - a) Form Wake County Form MBE-4, an affidavit 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 10% of the total cost of the contract; or
  - b) Form Wake County Form MBE-5, documentation of good faith effort to recruit MBE participation in the project, including any advertisements, solicitations, and evidence of other specific actions demonstrating recruitment of minority businesses for participation in the project. [Ref: N.C.G.S. §143-128.2.(c)(1)]
4. Within 30 days after the award of the contract, or sooner if stipulated in the Bidding Documents, the contractor shall provide to the County with a list of all subcontractors that the contractor will use on the project. [Ref: N.C.G.S. §143-128.2.(c)(2)]
5. During the construction of a project, if it becomes necessary to replace an MBE subcontractor, the prime contractor shall advise the Owner in writing. No MBE subcontractor may be replaced with a different subcontractor except for the following:

a) If the subcontractor's bid is later determined by the contractor or construction manager at risk to be nonresponsible or nonresponsive, or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work; or

b) With the approval of the County for good cause. [Ref: N.C.G.S. §143-128.2(d)]

Prior to substituting a subcontractor, the contractor shall identify the substitute subcontractor and inform the County, in writing, of its good faith efforts to replace with

another MBE Subcontractor. Good faith efforts as set forth in N.C.G.S. § 143-131(b) apply to the selection of a substitute subcontractor. [Ref: N.C.G.S. §143-128.2(d)]

6. Prior to the final payment being due to the contractor Wake County Form MBE 6, which provides certification of actual work performed by Minority Businesses, must be submitted

### **3.3 COUNTY RECORD KEEPING PROCEDURES FOR MONITORING CONTRACTOR COMPLIANCE ON COUNTY BUILDING CONSTRUCTION AND REPAIR PROJECTS.**

A. **FORMAL CONTRACTS.** The County shall maintain for three years from project completion date all records with respect to:

1. Those contractors notified or solicited for each building construction or repair projects, noting all that are minority businesses and their minority category.
2. Those contractors that bid or otherwise responded to advertisements or notices of building construction or repair projects, noting all that are minority businesses and their minority category.
3. Prime contracts awarded, the amount of the contracts, identity of those that are minority business.
4. The subcontractors utilized on projects, identity of minority subcontractors, type work performed by minority subcontractors amount paid minority businesses as reported by the prime contractor(s) awarded the bid.
5. The percentage of work on the project performed by minority businesses as reported by the prime contractor. [Ref: N.C.G.S. §143-128.2(i)]

B. **INFORMAL CONTRACTS:** Documents required to be kept by the County under this section will be maintained in the County Finance Department.

1. The requirements for record keeping for Informal Contracts is the same as for Formal Contracts listed above.

### 3.4 **COMPLAINT PROCEDURES.**

#### **A. Formal and Informal Contracts:**

1. Alleged violations of the provisions of this MBE plan by any party should be reported in writing to the County Manager or his/her designee.
2. The County Manager or his/her designee shall review all facts available and respond in writing. Unresolved complaints may be presented to the Board of County Commissioners. The decision rendered by the Board will be final.



**Attach to Bid**

**Wake County Form MBE-1 (2002)**

**Identification of Minority Business Participation**

I, \_\_\_\_\_

(Bidder)

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

Firm Name, Address and Phone #	Work Type	*Minority Category

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

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

**Attach to Bid**

**Wake County – Form MBE-2 (2002)**

**Listing of the Good Faith Effort**

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

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 inter 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 GS 143-128.2(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 North Carolina, County of \_\_\_\_\_  
Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_  
Notary Public \_\_\_\_\_  
My commission expires \_\_\_\_\_

**{Note: Attach this form to Bid Only if Bidder Performs All Work With Own Workforces}**



# Wake County Form MBE-3 (2002)

## Intent to Perform Contract with Own Workforce

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

I hereby certify that it is our intent to perform 100% of the work required for the project  
\_\_\_\_\_  
(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 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 North Carolina, County of \_\_\_\_\_

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

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

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

# Wake County Form MBE-4 (2002)

## Portion of the Work to be Performed by Minority Firms

**\*\* (NOTE: THIS FORM IS NOT TO BE SUBMITTED WITH THE BID PROPOSAL) \*\***

If the portion of the work to be executed by minority businesses as defined in GS143-128.2(g) 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, to the Owner, by the apparent lowest responsible, responsive bidder within 72 hours after notification of being the apparent low bidder.

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

\_\_\_\_\_  
(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	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**)

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 North Carolina, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 2003

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

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

# Wake County Form MBE-5 (2002)

## Good Faith Efforts

**\*\* (NOTE: THIS FORM IS NOT TO BE SUBMITTED WITH THE BID PROPOSAL) \*\***

If the goal of 10% participation by minority business is not achieved, this affidavit shall be provided, to the Owner apparent lowest responsible, responsive bidder within 72 hours after notification of being the apparent low bidder.

Affidavit of: \_\_\_\_\_  
(Bidder)

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(Attach additional sheets if required)

Name and Phone Number	*Minority Category	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**)

### Documentation of the Bidder's good faith efforts to meet the goals set forth in these provisions. Examples of documentation include, but are not limited to, the following evidence:

- A. 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.
- B. Copies of quotes or responses received from each firm responding to the solicitation.
- C. A telephone log of follow-up calls to each firm sent a solicitation.
- D. 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.
- E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.
- F. Copy of pre-bid roster.
- G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.
- H. Letter detailing reasons for rejection of minority business due to lack of qualification.
- I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or c 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.

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



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

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

State of North Carolina, County of \_\_\_\_\_

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

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

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

# Wake County Form MBE-6 (2002)

## CERTIFICATION of Actual Work Performed by Minority Businesses

**NOTE: THIS FORM IS TO BE SUBMITTED PRIOR TO FINAL PAYMENT BEING DUE THE CONTRACTOR**

Affidavit of \_\_\_\_\_  
(Contractor Name)

\_\_\_\_\_  
(Project Name)

Project ID# \_\_\_\_\_ Final Contract Amount \$ \_\_\_\_\_

I do hereby certify that \_\_\_\_\_% of the total dollar amount of the contract was performed with minority business. Such work was subcontracted to the firms listed below.

Attach additional sheets if required

Name and Phone Number	*Minority Category	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**)

**\*\*\*Must list all businesses used, including Prime Contractor, and note which are minority and category\*\*\***

The undersigned hereby certifies that above information is correct to the best of his/her knowledge, information and belief.

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



State of North Carolina, County of \_\_\_\_\_  
Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 2002  
Notary Public \_\_\_\_\_  
My commission expires \_\_\_\_\_

CONSTRUCTION AGREEMENT

FOR

**Wake County Office Building – 12<sup>th</sup> & 14<sup>th</sup> Floors Upfit**

THIS AGREEMENT, made as of the \_\_\_ day of \_\_\_\_\_, 20\_\_\_, by and between \_\_\_\_\_, a corporation, hereinafter called the Contractor, and Wake County, a body corporate and politic and a political subdivision of the State of North Carolina, hereinafter called the Owner.

WITNESSETH:

That the Contractor and the Owner, for the consideration herein named, agree as follows:

1. SCOPE OF WORK - The Contractor shall furnish and deliver all of the materials, and perform all of the work required by this Agreement and the following enumerated documents, which are attached hereto and made a part hereof as if fully contained herein: General Conditions, Supplemental Conditions, Contract Construction Schedule, Specifications, Drawings entitled "**Wake County Office Building – 12<sup>th</sup> & 14<sup>th</sup> Floors Upfit**" which Drawings are listed in the Specifications, Performance Bond, Labor and Material Payment Bond, Insurance Certificates, and the following addenda:

Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_

Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_

Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_

All of the documents listed, referenced or described in this paragraph, together with Modifications made or issued in accordance herewith are the Contract Documents, and the work, labor, materials and completed construction required by the Contract Documents and all parts thereof is the Work. The Contractor shall perform the Work in the time, manner and form required by the Contract Documents. The Contract Documents constitute the entire agreement between Owner and Contractor.

2. The Contractor agrees to commence work not later than three (3) days after the commencement date specified in the Notice to Proceed. The Contractor agrees to complete fully all Work hereunder on the dates specified in the Contract Documents, as may be adjusted in accordance with the terms thereof. Time is of the essence with respect to all dates specified in the Contract Documents as Completion Dates.

Liquidated damages for failure(s) to complete in accordance with the provisions of this paragraph shall be computed and assessed against the Contractor in accordance with the Contract Documents.

3. The Owner hereby agrees to pay to the Contractor for the faithful performance of this Agreement, and the Contractor hereby agrees to perform all of the Work, for the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in the lawful money of the United States, subject to adjustments as provided for in the Contract Documents. Payment of the Contract Price shall be in accordance with Articles 20 and 21 of the General Conditions.

4. It is further mutually agreed between the parties hereto that if at any time after the execution of this Agreement and the Performance Bond and Labor and Material Payment Bond 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 or either of them cease to be adequate to cover the performance of and payment for the Work, the Contractor shall, at its expense, within five (5) days after 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 Contractor shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of or payment for the Work shall be furnished in a manner and form satisfactory to the Owner.

5. Terms used in this Agreement which are defined in the Contract Documents shall have the meanings designated in those Contract Documents.

6. The Contractor agrees to indemnify and hold harmless the Owner against liability for damages arising out of bodily injury including death, or property damage, to any person or persons only to the extent that the fault of the Contractor or its derivative parties is a proximate cause of the loss, damage, or expense to be indemnified. This obligation to indemnify includes the obligation to pay any attorney's fees, litigation expenses, or court costs actually incurred by Owner to the extent that the fault of the Contractor or its derivative parties is a proximate cause of the fees, expenses, or cost to be indemnified. It is the intent of this provision to require the Contractor to indemnify the Owner to the fullest extent permitted by North Carolina law. The language and definitions in this section shall be construed consistent with N.C.G.S. 22B-1 et seq. as it may be amended. The indemnification obligation under this paragraph shall not be limited in any way by any limitation of the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under workers' compensation acts, disability benefits acts or other employee benefit acts.

7. The laws of the State of North Carolina shall apply to the interpretation and enforcement of this Agreement. Any and all suits or actions to enforce, interpret or seek damages with respect to any provision of, or the performance or nonperformance of, this Agreement shall be brought in the General Court of Justice of North Carolina sitting in Wake County, North Carolina, or the United States District Court sitting in Wake

County, North Carolina, and it is agreed by the parties that no other court shall have jurisdiction or venue with respect to such suits or actions.

8. To ensure compliance with the E-Verify requirements of the General Statutes of North Carolina, all contractors, including any subcontractors employed by the contractor(s), by submitting a bid, proposal or any other response, or by providing any material, equipment, supplies, services, etc, attest and affirm that they are aware and in full compliance with N.C.G.S. Chapter 64, Article 2 (N.C.G.S. 64-26(a)) relating to the E-Verify requirements.

9. By signing this agreement; accepting this contract/purchase order; or submitting any bid, proposal, etc., vendors and contractors certify that as of the date of execution, receipt, or submission they are not listed on the Final Divestment List created by the NC Office of State Treasurer pursuant to NCGS 147 Article 6E, Iran Divestment Act, Iran Divestment Act Certification. Vendors and contractors shall not utilize any subcontractor that is identified on the Final Divestment List.

Any organization defined under NCGS 147-86.80(2), Divestment from Companies Boycotting Israel, shall not engage in business totaling more than \$1,000 with any company/business, etc. that boycotts Israel. A list of companies that boycott Israel is maintained by the NC Office of State Treasurer, pursuant to NCGS 147-86.81(a)(1). Any company listed as boycotting Israel is not eligible to do business with any State agency or political subdivision of the State.

10. If the source of funds for this contract is federal funds, the following federal provisions apply pursuant to 2 C.F.R. § 200.326 and 2 C.F.R. Part 200, Appendix II (as applicable):

Equal Employment Opportunity (41 C.F.R. Part 60); Davis-Bacon Act (40 U.S.C. 3141-3148); Copeland "Anti-Kickback" Act (40 U.S.C. 3145); Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708); Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387); Debarment and Suspension (Executive Orders 12549 and 12689); Byrd Anti-Lobbying Amendment (31 U.S.C. 1352); Procurement of Recovered Materials (2 C.F.R. § 200.322); and Record Retention Requirements (2 CFR § 200.324).

11. In consideration of signing this Agreement, the Parties hereby agree not to discriminate in any manner on the basis of race, natural hair or hairstyles, ethnicity, creed, color, sex, pregnancy, marital or familial status, sexual orientation, gender identity or expression, national origin or ancestry, marital or familial status, pregnancy, National Guard or veteran status, religious belief or non-belief, age, or disability with reference to the subject matter of this Contract. The Parties agree to comply with the provisions and intent of Wake County Ordinance SL 2017-4. This anti-discrimination provision shall be binding on the successors and assigns of the Parties with reference to the subject matter of this Contract.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the day and date first above written in a number of counterparts, each of which shall, without proof or accounting for other counterparts, be deemed an original contract.

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

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

Title: \_\_\_\_\_  
(President)

ATTEST: (CORPORATION)

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

Title: \_\_\_\_\_  
(Corporate Secretary)

(CORPORATE SEAL)

WITNESS:

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



WAKE COUNTY  
P. O. Box 550  
Raleigh, N.C. 27602

By: \_\_\_\_\_  
County Manager or Designee

This instrument has been pre-audited in the manner required by the local Government Budget and Fiscal Control Act.

\_\_\_\_\_  
Wake County Finance Officer

This instrument has been reviewed by Wake County Facilities, Design & Construction

\_\_\_\_\_  
Mark Forestieri  
Director, Facilities Design & Construction

The person responsible for monitoring the contract performance requirements is

\_\_\_\_\_. \_\_\_\_\_ Department Head Initials

PAYMENT BOND

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

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

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

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

Name of Contracting Body: County of Wake  
P.O. Box 550  
Raleigh, N.C. 27602

Amount of Bond: \_\_\_\_\_  
Dollars (\$ \_\_\_\_\_)

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

KNOW ALL MEN BY THESE PRESENTS, that we, the PRINCIPAL and SURETY above named, are held and firmly bound unto the above named owner, hereinafter called "Owner", 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 Owner identified as shown above and hereto attached:

NOW THEREFORE, if the Principal shall promptly make payment to all persons supplying labor and 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 modification 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 representatives, pursuant to authority of its governing body.

PAYMENT BOND

Executed in Four (4) Counterparts.

CONTRACTOR:

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

Title: \_\_\_\_\_  
(Corporation President or  
Vice President Only)

ATTEST: (Corporation)

\_\_\_\_\_  
(Corporation Secretary or Assistant  
Secretary Only)

(CORPORATE SEAL)

SURETY COMPANY:

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

\_\_\_\_\_  
(Attorney in Fact)

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

(SURETY CORPORATE SEAL)

COUNTERSIGNED:

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

Name and Address-Surety Agency

\_\_\_\_\_

\_\_\_\_\_

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

PERFORMANCE BOND

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

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

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

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

Name of Contracting Body: County of Wake  
P.O. Box 550  
Raleigh, N.C. 27602

Amount of Bond: \_\_\_\_\_  
Dollars (\$ \_\_\_\_\_)

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

KNOW ALL MEN BY THESE PRESENTS, that we, the PRINCIPAL and SURETY above named, are held and firmly bound unto the 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 countersigned representative, pursuant to authority of its governing body.

PERFORMANCE BOND

Executed in Four (4) Counterparts.

CONTRACTOR:

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

Title: \_\_\_\_\_  
(Corporation President or  
Vice President Only)

ATTEST: (Corporation)

\_\_\_\_\_  
(Corporation Secretary or Assistant  
Secretary Only)

(CORPORATE SEAL)

SURETY COMPANY:

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

\_\_\_\_\_  
(Attorney in Fact)

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

(SURETY CORPORATE SEAL)

COUNTERSIGNED:

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

Name and Address-Surety Agency

\_\_\_\_\_

\_\_\_\_\_

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



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

### ARTICLE 1.

### DEFINITIONS

- 1.1 Agreement - The Construction Agreement, these General Conditions, and any Supplementary Conditions.
- 1.2 AIA - The American Institute of Architects.
- 1.3 ASTM - The American Society for Testing and Materials.
- 1.4 Beneficial Occupancy – The point at which the Project can be occupied by the Owner for its intended purpose, upon achievement of Substantial Completion, as defined in 1.40.
- 1.5 Change Order - A written order to the Contractor signed by the Owner and the Designer authorizing an addition, deletion, or revision in the Work and/or an adjustment in the Contract Price and/or the Contract Time issued after execution of the Construction Agreement. See paragraph 14.1.
- 1.6 Completion Date - Those dates identified as Completion Dates in the Contract Construction Schedule or elsewhere in the Contract Documents.
- 1.7 Construction Agreement – The document executed by the Contractor and the Owner to formally memorialize their consent to the terms of the Agreement.
- 1.8 Construction Change Directive – A written order to the Contractor signed by the Owner and the Designer directing an addition, deletion, or revision in the Work after execution of the Construction Agreement, in circumstances when the parties have been unable to agree on an adjustment to the Contract Price or the Contract Time, but the Owner requests that the Contractor proceed with said Work subject to adjustment of the Contract Price and/or Contract Time under the procedures described herein.
- 1.9 Construction Manager(s) - The person or firm designated as the Construction Manager in the Contract Documents, or their authorized representatives. The Construction Manager(s), as referred to herein, will be referred to hereinafter as if each were of the singular number, masculine gender.
- 1.10 Contract Construction Schedule - That schedule described in Article 13 hereof and identified as the Contract Construction Schedule.
- 1.11 Contract Documents - All of the documents that make up the Agreement, plus the Drawings and Specifications that describe the scope of the Work, plus allowable Modifications to the Contract Documents.
- 1.12 Contract Price - The total monies payable to the Contractor under the Contract Documents pursuant to paragraph 15.1 of the Agreement.
- 1.13 Contract Time - The number of calendar days stated in, or computed from, the Contract Documents for the completion of the Work, or any portion thereof. See, particularly, Article 13 hereof and the Contract Construction Schedule. Time of completion as specified therein is of the essence. The time used and referred to on the Project will be that time which is



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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observed in Raleigh, North Carolina, being Eastern Daylight Savings Time (EDT), Eastern Standard Time (EST), or other as designated by the Designer.

- 1.14 Contractor - The Contractor shall be that party identified as such in the Agreement.
- 1.15 Days - Unless otherwise indicated, the term "days" shall mean consecutive calendar days.
- 1.16 Daylight Hours - The hours or portions of hours between sunrise and sunset local time.
- 1.17 Designer(s) – The person or firm designated as the Designer in the Contract Documents, or their authorized representatives. The Designer(s), as referred to herein, shall mean architect, landscape architect, and/or engineer. They will be referred to hereinafter as if each were of the singular number, masculine gender.
- 1.18 Drawings - The Drawings are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location, and dimensions of the Work, and generally including plans, elevations, sections, details, schedules and diagrams. A list of the Drawings is contained in the Supplemental General Conditions.
- 1.19 Field Order - A written order issued by the Designer which clarifies or interprets the Contract Documents or orders minor changes in the Work in accordance with the Contract Documents. See paragraph 14.2.
- 1.20 Final Completion - The point at which the Contractor has, as determined by the Designer, completed the Work, with the exception of guaranty and warranty obligations, and becomes entitled, upon the recommendation of the Designer and determination by the Owner, to final payment.
- 1.21 The words "furnish," "furnish and install," "install," and "provide" or words with similar meanings shall be interpreted, unless otherwise stated, to mean furnish and install complete, in place and ready for service.
- 1.22 Liquidated Damages – See paragraph 13.18 of these General Conditions.
- 1.23 Modification - (A) a written amendment to the Contract Documents signed by the Owner and the Contractor and identified therein as such, (B) a Change Order, (C) Construction Change Directive, or (D) a Field Order. A Modification may only be issued after execution of the Agreement.
- 1.24 Notice of Award - The written notice by the Owner to the Contractor that the Contractor is the successful Bidder and that upon compliance with the conditions precedent to be fulfilled by the Contractor within the time specified, the Owner will execute and deliver the Agreement to him.
- 1.25 Notice to Proceed - See paragraph 13.3.
- 1.26 Owner - The Owner is the person designated as such in the Agreement.



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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- 1.27 Owner's Authorized Representative - A person, or persons, employed by the Owner and designated from time to time by written notice to the Contractor to administer the Contract Documents, and to observe and monitor the Work on behalf of the Owner with authority and responsibility as herein specified.
- 1.28 Notice - The term "notice" or "written notice" as used herein shall mean and include all written notices, demands, instructions, and claims approvals and disapprovals furnished by the Owner or the Designer to obtain compliance with the requirements of the Contract Documents, as well as all written notices, demands, instructions and claims furnished by the Contractor as required by the Contract Documents. Where notice is required under the terms of the Contract Documents written notice shall always be required, and oral or "constructive" notice shall be insufficient and ineffective as notice. Email or other electronic delivery shall be insufficient and ineffective as notice unless specifically allowed by the Supplementary Conditions or a Modification to the Agreement. Written notice shall be deemed to have been duly served on the date that it is delivered in person to the individual or to a member of the firm, to an officer of the corporation for whom it is intended, to an authorized representative of such individual, firm, or corporation, or on the date that it is mailed by registered or certified mail, return receipt requested, addressed to the last business address of such individual, firm, or corporation known to the person giving the notice. Written notice may also be given by facsimile transmission, provided that proof of delivery is obtained. In the case of delivery in person, such delivery shall not be effective unless and until a written and signed receipt showing the date and time of delivery is obtained.
- 1.29 Project - The total construction of which the Work performed under the Contract Documents may be the whole or a part.
- 1.30 Project Expediter – As used herein, is an entity stated in the Contract Documents, designated to effectively facilitate scheduling and coordination of Work activities. For the purpose of a single prime contract, the single prime contractor is designated as the Project Expediter. For the purpose of a project involving separate prime contracts, the Contractor for general work shall be designated as the Project Expediter unless otherwise indicated in the Supplementary General Conditions. See paragraph 7.27.
- 1.31 Project Manager - That person designated by the Contractor in accordance with paragraph 7.2 who shall be in general charge of the Work and its performance and who shall have the authority set forth in the last sentence of paragraph 7.2.
- 1.32 Request for Information - A written communication from the Contractor to the Designer for any interpretation of, or information needed, required, or desired under the Contract Documents. The Owner reserves the right to determine the reasonable format and contents required for a Request for Information. In any Request for Information, the Contractor shall state a reasonable date by which a response is necessary in order to avoid delay in progress on the Work and shall make such request sufficiently in advance of such date as to avoid any such delay. The Designer shall respond in writing to the Request for Information by the date stated by the Contractor unless he cannot reasonably do so, in which case he shall prior to that date notify the Contractor of the date by which he can reasonably respond. The Contractor shall not be entitled to any additional time for the completion of the Work or any portion thereof by reason of the Designer's failure to respond



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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if he has not submitted his Request for Information sufficiently in advance to allow the Designer a reasonable time within which to respond.

- 1.33 Request for Payment - The form, in the form of AIA Document G702 (latest ed.) or other published document approved by Owner, which is to be used by the Contractor in requesting progress payments and which is to include a Schedule of Values as required by the Contract Documents and an affidavit of the Contractor that progress payments theretofore received from the Owner on account of the Work have been applied by the Contractor to discharge in full all the Contractor's obligations incurred in connection with Work covered by all prior applications for payment. See paragraph 20.2.
- 1.34 Resident Superintendent - That person designated by the Contractor in accordance with paragraph 7.2 who has day-to-day responsibility for the prosecution of the Work and the obtaining of proper materials and equipment, and adequate labor and who shall have the authority set forth in the last sentence of paragraph 7.2.
- 1.35 Schedule of Values - Any breakdown of the Contract Price which may be required by the Contract Documents, and designated as such. See paragraph 20.1.
- 1.36 Specifications - That portion of the Contract Documents consisting generally of the written requirements for materials, equipment, construction systems, standards, and workmanship for the Work and performance of related services.
- 1.37 Subcontractor - A person, firm, or corporation who has entered into a direct contract with the Contractor to perform any of the Work at the Project.
- 1.38 Submittal - Shop drawings, product data, samples, and other documents required by the Contract Documents to be submitted by the Contractor to the Designer.
- 1.39 Submittal Register - See paragraph 13.2 of these General Conditions.
- 1.40 Substantial Completion - The point at which the Work, and Work by other Contractors on or in connection with the Project, as determined by the Designer, is sufficiently complete in accordance with the Contract Documents that it can be beneficially occupied by the Owner, and the Work can be utilized by the Owner for its intended use, and all necessary permits and permissions for Beneficial Occupancy and utilization having been obtained by the Contractor. All operations and maintenance manuals, Owner training, and as-built drawings must be submitted prior to Substantial Completion being achieved.
- 1.41 Sub-subcontractor - A person or entity that has a direct or indirect contract with a Subcontractor to perform any of the Work at the Project.
- 1.42 Work - The construction and services required by the Contract Documents, including all labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations.
- 1.43 All references in the Contract Documents to the masculine shall be interpreted as including the feminine or neuter and all references in the Contract Documents to the singular or the



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

plural shall be interpreted as including the other, as may be appropriate in the reasonable interpretation of the Contract Documents.

### **ARTICLE 2. CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS**

- 2.1 It is the intent of the Specifications and Drawings and other Contract Documents to describe a complete Project in accordance with the Contract Documents.
- 2.2 The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If the Contractor finds a conflict, error or discrepancy in the Contract Documents, the Contractor shall notify the Designer in writing before proceeding with the Work affected thereby. In resolving such conflicts, errors and discrepancies, the Contract Documents shall be given preference in the following order: Construction Agreement, Modifications, Addenda, Supplemental Conditions, General Conditions, Specifications, and Drawings. Figure dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings. Any Work that may reasonably be inferred from the Contract Documents as being required to produce the intended result shall be supplied whether or not it is specifically called for. Work, materials or equipment described in words which, so applied, have a well known technical trade meaning shall be deemed to refer to such meaning and to incorporate any recognized standards which are a part of such meaning.
- 2.3 Miscellaneous items, accessories and work which are not specifically mentioned, but which are essential to produce a complete and properly operating installation, or useable structure or plant providing the indicated function shall be furnished and installed without change in the Contract Price. Such miscellaneous items and accessories shall be of the same quality standards, including material, style, finish, strength, class, weight and other applicable characteristics, as specified for the major component of which the miscellaneous item or accessory is an essential part, and shall be approved by the Designer before installation. This requirement is not intended to include major components not covered by or inferable from the Contract Documents.
- 2.4 The Work of all trades under the Contract Documents shall be coordinated by the Contractor in such a manner as to obtain the best workmanship possible for the entire Project and all components of the Work shall be installed or erected in accordance with the best practices of the particular trade.
- 2.5 The Contractor shall fully complete the Work and shall be responsible for all of the Work under the Contract Documents to which the Construction Agreement applies. If the Contractor is prevented from doing so by any limitation of the Contract Documents, the Contractor shall immediately give notice thereof to the Designer and the Owner in writing before proceeding with the construction in the area where the problem or limitation exists.
- 2.6 Standard specifications or manufacturers' literature, when referenced, shall be of the latest revision or printing unless otherwise stated and is intended to establish the minimum requirements acceptable.



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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- 2.7 For those materials specified without the use of brand names, the Contractor shall submit within thirty (30) days after his receiving the Construction Agreement for signatures, any product that meets the express requirements of the Specifications.

Such Submittal shall include manufacturer's data, test reports, performance data and certifications, samples, erection details, and other applicable information as required to permit determination by the Designer whether such proposed products are suitable. The Designer shall be the sole judge as to the suitability of any proposed product. The burden of proof of quality rests with the Contractor.

- 2.8 The Contractor is required to examine and read the complete set of Contract Documents for information concerning the Work, because some of the Work for which the Contractor will be responsible may be indicated on or in documentation applying primarily to the Work of one or more other separate prime contractors. No allowance will be made for the Contractor's failure to become familiar with the complete set of project documents.

- 2.9 Contractor's requests for clarification or information shall clearly define the cause(s) of Contractor's request and, as appropriate, shall include Contractor's interpretation and Contractor's proposed solution.

### **ARTICLE 3. FAMILIARITY WITH WORK, CONDITIONS AND LAWS**

- 3.1 The Contractor has investigated prior to bidding and is satisfied with all conditions affecting the Work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electrical power, roads and uncertainties of weather, or similar physical conditions at the Project site, and the character of equipment and facilities needed prior to and during prosecution of the Work. The Contractor is satisfied as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from inspection of the Project site, including all exploratory work done by the Owner, as well as from information presented by the Contract Documents, or any other information made available to the Contractor prior to receipt of bids. Any failure by the Contractor to become acquainted with the available information shall not relieve the Contractor from the responsibility for estimating properly the difficulty or cost of successfully performing the Work.

- 3.2 The Contractor shall be entitled to rely upon all information furnished to the Contractor in writing by the Owner with respect to the Project site and to make all inferences from it that would reasonably be made by a contractor having knowledge and experience with similar work; however, the Contractor shall not be entitled to infer from Owner-supplied information any fact or condition which would not be inferred by a contractor having knowledge and experience with similar work and, if the Owner-supplied information is inadequate or insufficient in any respect, the Contractor shall be required to obtain independently such other information as a knowledgeable and experienced contractor would prudently obtain in order to evaluate any such condition.

- 3.3 The Contractor specifically acknowledges familiarity with all Federal, State, and local laws, ordinances, rules, and regulations which may in any manner affect those engaged or



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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employed in the Work, or the materials or equipment in or about the Work, or in any way affect the conduct of the Work and agrees that the Contractor and the Contractor's employees, subcontractors, and suppliers will, at all times, comply with same. If the Contractor shall discover any provisions in the Contract Documents which are contrary to or inconsistent with any such law, ordinance, rule, or regulation, the Contractor shall immediately give notice thereof to the Designer and the Owner in writing, identifying any items of Work affected, and the Contractor shall not proceed until the Contractor has received written direction from the Designer with respect to these items. If the Contractor performs contrary to or inconsistently with any such law, ordinance, rule, or regulation without giving such notice, the Contractor shall bear all costs which are a consequence of such performance.

- 3.4 At times selected by the Designer after execution by the Contractor of the Construction Agreement, a pre-construction conference shall be scheduled and conducted for the benefit of the Project.

### **ARTICLE 4. BONDS**

- 4.1 A performance bond in the full amount of the Contract Price shall be required of the Contractor to guarantee the faithful performance of the Work in compliance with the Contract Documents, in such form as may be required by law and approved by the Owner. The bond shall be dated the same date as the Construction Agreement and must be accompanied by a current copy of the power of attorney for the attorney-in-fact executing such bond on behalf of a surety company licensed to do business in the state of North Carolina.
- 4.2 A payment bond in the full amount of the Contract Price shall be required of the Contractor to guarantee the payment of all labor and material costs or claims in connection with compliance with the Contract. The payment bond shall be in such form as may be required by law and approved by the Owner. Said bond shall be dated and executed in the same manner as the performance bond in paragraph 4.1.

### **ARTICLE 5. INSURANCE AND INDEMNITY**

#### **5.1 CONTRACTOR PROVIDED INSURANCE**

The Contractor shall, without limiting its obligations or liabilities, procure, pay for and maintain such insurance as is required by law and as is required by this Agreement to protect the Contractor and the Owner from claims for damages for bodily injury, including death, and from claims for property damage which may arise from the Contractor's or its representatives', consultants', Subcontractors', agents', or employees' operations under this Agreement. Such insurance shall be of the kinds and have limits of liability and coverages not less than the minimum limits hereinafter specified or required by law, whichever is greater. The Owner makes no representation as to the adequacy or sufficiency of such coverages. The following requirements shall in no way be construed to limit or eliminate the liability of the Contractor, which arises from performance of Work under the Agreement. The Contractor is strictly responsible for any losses, claims, and costs of any kind which exceed the Contractor's limits of liability, or which may be outside the coverage scope of the policies.



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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The insurance specified shall be provided by an insurer approved by the Owner, authorized to do such business in the State of North Carolina, and on terms approved by the Owner. Insurance companies utilized shall have a minimum rating of A- and Class VII as evaluated by the most current A.M. Best Rating Guide. If the insurer has a Best Rating less than A- and Class VII, the Contractor must receive specific written approval from the Owner prior to proceeding with any Work under the Agreement. All agents and brokers shall hold valid licenses from the State of North Carolina. Before commencing mobilization to the Project site and not later than 7 days after the receipt of the Construction Agreement by the Contractor for signatures, the Contractor shall furnish to the Owner a certificate or certificates of insurance in a form satisfactory to the Owner. Upon request of the Owner, the Contractor shall provide the Owner with certified copies of the insurance policies required by this Article, including without limitation declaration pages, conditions, exclusions and endorsements, and confirmation that each policy premium has been paid for the required term of this Agreement. A copy of the umbrella policy shall be provided to the Wake County Finance Department. Certificates shall be signed by a person authorized by that insurer to bind coverage on its behalf. In the event of any such cancellation, non-renewal, reduction, restriction, or change in any insurance, the Contractor is obligated to replace such insurance within 7 days without a gap in coverage and file accordingly such notice with the Owner, and other interested parties. Failing immediate receipt of evidence of such replacement of insurance the Owner reserves the right to procure such insurance as the Owner considers desirable and the Contractor shall pay or reimburse the cost of the premium in respect thereof. It is expressly provided, however, that any action or inaction on the part of the Owner in this respect shall in no way change or reduce the Contractor's responsibilities and liabilities under this Agreement. Self-funded, policy fronting, or other non-risk transfer insurance mechanisms are not acceptable without prior written approval of the Owner. Full disclosure of such a program must be made prior to commencing mobilization to the Project site. Failure to make a full disclosure constitutes a material breach of the Agreement, justifying termination for default.

The Contractor shall name the Owner, the Designer, the Designer's consultants, and the Construction Manager as additional insureds under all its insurance contracts (except workers' compensation) with respect to and including without limitation liability arising out of activities performed by or on behalf of the Contractor, products and completed operations of the Contractor, and automobiles owned, hired, leased, or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to additional insureds.

For any claims related to this Project, the Contractor's insurance or self insurance shall be primary and noncontributory with respect to the Owner's insurance. Any insurance or self-insurance maintained by the Owner shall be excess and noncontributory with respect to the Contractor's insurance.

All policies of insurance shall contain a clause waiving rights of subrogation against the Owner, unless the Owner approves otherwise in writing.

Limits of coverage are not to be amended by deductible clauses of any nature without the express written consent of the Owner. The Contractor shall be solely responsible for any deductible assumptions that may exist in any insurance policies required under this





## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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Agreement. In addition, the Contractor shall be responsible and shall not be reimbursed for any losses arising from any risk or exposure not insured as required herein, or not covered as a result of a normal policy exclusion or that falls within the self insured retention, if Contractor self insured.

The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

The claim provisions in the Contractor's insurance policies must specifically state the insurance company or Contractor's Third Party Administrator, if self insured, has both the right and duty to adjust a claim and provide defense.

The policies shall not contain any provision or definition which would serve to exclude or eliminate from coverage third party claims, including exclusions of claims for bodily or other injury to shareholders, partners, officers, directors, or employees of the insured, the premises owner, real estate manager, or the insured's Subcontractor, or any family relative of such persons.

If the policies contain any warranty stating that coverage is null and void (or words to that effect) if the Contractor does not comply with the most stringent regulations governing the Work, it shall be modified so that coverage shall be afforded in all cases except for the Contractor's willful or intentional noncompliance with applicable government regulations.

Any failure by any person to comply with reporting or other provisions of the policy including breach of warranties, shall not affect coverage provided to the Owner and its representatives, officials, and employees.

The insolvency or bankruptcy of the Insured or of the Insured's estate shall not relieve the insurance companies of their obligations under these policies. Any clauses to the contrary are unacceptable and must be stricken.

Failure to comply with these requirements shall be a material breach of this Agreement justifying termination for default.

### 5.1.1 Worker's Compensation and Employers' Liability Insurance

The Contractor and its Subcontractors shall procure and maintain Workers' Compensation Insurance in the amount and type required by the State of North Carolina and federal law for all employees employed under the Agreement who may come within the protection of Workers' Compensation Laws and covering all operations under the Agreement whether performed by the Contractor or by his Subcontractors. In jurisdictions not providing complete Workers' Compensation protection, the Contractor and his Subcontractors shall maintain employers' liability insurance in an amount, form, company, and agency satisfactory to the State of North Carolina and the Owner for the benefit of all employees not protected by Workers' Compensation Laws and covering all operations under the Agreement whether performed by the Contractor or by his Subcontractors.

The Contractor shall pay such assessments as will protect the Contractor and the Owner from claims under the Workers' Compensation Laws, workers' or workmen's compensation



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

disability benefits, and other similar employee benefit acts. The current Experience Modification Factor shall be indicated on the Certificate of Insurance.

Coverage under this section shall be as required by federal and state Workers' Compensation and Occupational Disease Statutes, and shall have minimum limits as follows:

Coverage A:		Statutory, State of North Carolina
Employers' Liability:	Each Accident	\$1,000,000
	Disease - Policy Limit	\$1,000,000
	Disease - Each Employee	\$1,000,000

Such insurance shall include Voluntary Compensation coverage, a Waiver of Subrogation in favor of the Owner as well as other endorsements that may be required by applicable jurisdictions, i.e. United States Longshoremen and Harbor Workers Act and maritime coverage (Jones Act).

### 5.1.2 Automobile Liability Insurance

The Contractor shall procure and maintain automobile insurance against liability for bodily injury and property damage as described below, that may arise with respect to the Work being performed under the Agreement, and as will provide protection from claims which may arise out of or result from the Contractor's performance of the Work and the Contractor's other obligations under the Agreement, whether such performance of the Work is by the Contractor, by any representative or Subcontractor, by anyone, both officially and personally, directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

This policy of insurance shall carry the following minimum Limit of Liability:

Combined Single Limit	\$1,000,000
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The policy of insurance shall contain or be endorsed to include the following:

- a) owned, hired, and non-owned automobile liability.
- b) If the policy contains a warranty stating that coverage is null and void (or words to that effect) if the transporter does not comply with the most stringent regulations governing the Work, it shall be modified so that coverage shall be afforded in all cases except for the transporter's willful or intentional noncompliance with applicable government regulations.

Any failure by any party to comply with reporting or other provisions of the policy including breach of warranties, shall not affect coverage provided to the Owner and its representatives, officials, and employees.

No subcontracting of waste hauling shall be permitted without prior, written approval of the Owner.



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

### 5.1.3 General Liability

This policy must be written on an Occurrence basis, with the following minimum Limits of Liability:

General Aggregate per project	\$2,000,000.00
Products/Completed Operations Aggregate	\$2,000,000.00
Bodily Injury and Property Damage csl/each occurrence	\$1,000,000.00
Personal Injury and Advertising Injury	\$2,000,000.00

The policy of insurance shall contain or be endorsed to include the following:

- a) Blanket Contractual Liability covering Contractor's indemnification obligations under this Agreement, in accordance with ISO policy form CG 00 01. Modifications to the standard provision will not be acceptable if they serve to reduce coverage.
- b) Premises/Operations Liability.
- c) Explosion, collapse, and underground fault.
- d) Independent Contractors and Independent Subcontractors coverage.
- e) Broad Form Property Damage.
- f) Personal Injury
- g) Cross Liability/Severability of Interest clause.
- h) Employer's Stop-Gap Liability endorsement, if applicable.
- i) Amendment of the Pollution Exclusion Endorsement to allow coverage for bodily injury or property damage caused by heat, smoke, or fumes from a hostile fire.
- j) Designated General Aggregate Limit Endorsement if required by the Supplemental General Conditions.

Coverage shall remain continuously in effect and without interruption for at least 6 years from the date of the Notice of Award and shall include coverage for exposures arising from operations that have been completed. The Contractor shall furnish the Owner and each other additional insured listed in the Agreement to whom the Certificates have been issued, evidence satisfactory to the Owner of continuation of such insurance at the date of Preliminary Acceptance and each year thereafter.

### 5.1.4 Pollution Legal Liability (PLL)

Pollution Legal Liability coverage will be provided if required by the Supplementary General Conditions.

### 5.1.5 Umbrella Liability



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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The Contractor shall maintain an occurrence basis (as distinguished from a "claims made" basis) Umbrella Liability policy (true follow form) over the underlying General Liability, Automobile Liability, and Employer's Liability, with the following limits of liability:

Each Occurrence	\$3,000,000
Aggregate	\$3,000,000

On a fully insured basis such coverage will be subject to a deductible no greater than \$10,000 per occurrence where coverage is not provided by the underlying insurance, but is provided by the Umbrella Liability policy.

The Contractor may use any combination of primary and umbrella insurance policies to comply with the insurance requirements, provided the resulting insurance is equivalent to the insurance stated herein.

All Occupational Disease exclusions must be deleted. Any Pollution Exclusion must be amended to allow coverage for bodily injury or property damage caused by spill, upset, overturn, heat, smoke, or fumes from a hostile fire.

### 5.1.6 Property Insurance

The Contractor shall purchase All Risk Property Insurance on a Completed Value Form in the names of the Owner, Contractor, Subcontractors, and sub-subcontractors as their interests may appear with limits as follows:

- a) Full insurance value of the Work, or
- b) Amount equal to the Contract Price for the Work, whichever is higher.

The Contractor is responsible for all physical damage to owned or rented machinery, tools, equipment, forms, and other items owned, rented or used by the Contractor and/or Subcontractor(s) in the performance of the Work. The insurance coverage evidencing such shall include a waiver of subrogation in favor of the Owner.

### 5.1.7 Valuable Papers And Records

The Contractor shall provide valuable papers and records insurance with coverage in an amount commensurate with project scope and set forth in the Supplementary General Conditions.

### 5.1.8 Claims

The Contractor shall notify the Owner within 24 hours of any claims or alleged claims received by the Contractor covered by any of the policies of insurance required in this Agreement. The Contractor shall provide a written copy of the claim or alleged claim to the Owner within 3 days of the Contractor's receipt of the claim or alleged claim. If a claim is



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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settled to the satisfaction of the claimant, the Contractor shall submit a copy of the claimant's release to the Owner.

If a claim or alleged claim is rejected by the Contractor and/or its insurance company, the Contractor shall immediately report this fact to the Owner.

Should 30 days elapse after the claim or alleged claim has been received by the Contractor, and the Contractor is not able to report a settlement or rejection of the claim, it shall report to the Owner the steps being taken with respect to the claim.

Without limiting the foregoing, the Contractor shall notify in writing the county risk manager of any paid or incurred claims which may impair annual aggregate or general liability.

### 5.1.9 Deductibles and Self-insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the Owner. At the option of the Owner, either: the insurer shall reduce to a maximum of \$250,000 or eliminate such deductibles or self-insured retentions with respect to the Owner, or the Contractor shall provide evidence of collateral provided to insurers or procure a bond guaranteeing payment of losses and related investigations, claim administration, and defense expenses within the deductible or self-insured retention amount. Any self-insured retention or deductible amount on the policy shall not reduce the amount of collectible limits or liability.

### 5.1.10 Subcontractors

The Contractor shall include all Subcontractors as Insureds under its policies, or shall furnish separate certificates, policies, and endorsements for each Subcontractor the Contractor intends to use. If a Subcontractor does not take out insurance in his own name and the Contractor wishes to provide insurance protection for such Subcontractor and such Subcontractor's employees, the Contractor shall either (a) procure appropriate policies in the name of the Subcontractor, or (b) cause a rider or riders to be attached to the Contractor's policies which shall identify the Subcontractor thereby covered; provided, however, in the case of the latter option, such a rider need not be attached to the Contractor's workers' compensation policy if such policy by its terms is sufficiently broad to cover the employees of all Subcontractors performing Work under the Contract Documents. Except as otherwise approved by the Owner in writing, Limits of Liability and coverage scope must be at a minimum as stringent as required of the Contractor by the Contract Documents. All Work performed for the Contractor by any Subcontractor shall be pursuant to an appropriate agreement between the Contractor and the Subcontractor which shall contain provisions that waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by insurance as provided herein. Insurance monies received from any loss shall be divided as the respective interest of the parties affected shall appear.

## 5.2 OWNER CONTROLLED PROJECT SPECIFIC INSURANCE



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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In the event the Owner elects to purchase project-specific insurance affording coverage to the Contractor and Subcontractors, the terms and conditions of such coverage shall be set forth in the Supplementary Conditions.

### 5.3 CONTRACTOR AS JOINT VENTURE

If the Contractor is completing this Project on a joint venture basis, both joint venture partners retain all liabilities assumed by this Agreement, individually and collectively. This may include, but is not limited to, all premiums due, deductibles/self-insured retentions, coinsurance provisions, claim provisions, insurance policy conditions, and indemnification provisions hereunder.

Evidence of a Blanket Joint Venture Endorsement must be obtained from the General Liability and Contractor's Pollution Legal Liability carriers of each joint venture partner for a period of 6 years after completion of the Project, substantially as follows:

*With respect to "your work", and the "products-completed operations hazard", you are an insured for your liability arising out of the conduct of any partnership or joint venture of which you were a partner or member, even though this partnership or joint venture is not shown as a Named Insured in the Declarations. This coverage is excess over any available liability purchased specifically to insure the partnership or joint venture. This coverage will not inure to the benefit of any other party except you."*

### 5.4 INDEMNIFICATION

The Contractor, to the fullest extent not expressly prohibited by law, shall defend, indemnify, and save harmless the Owner, the Designer, the Construction Manager and their respective officials, officers, employees, and agents from and against any and all liabilities (foreseeable or unforeseeable), penalties, fines, forfeitures, demands, claims, causes of actions, suits, judgments, and costs and expenses incidental thereto, (including, without limitation, amounts paid pursuant to investigations, defense or settlements, and reasonable attorneys' fees), which any or all of them may hereafter suffer, incur, be responsible for, or pay out as a result of but not limited to:

- a) bodily injury (including sickness, disease, or death) to any person including but not limited to, the Contractor's employees or its representatives while on the site of the Project; or
- b) actual or alleged damage (including loss of use) to any property (public or private, including the Project or other property on the Project site); or
- c) contamination of or adverse effects on the environment arising directly or indirectly out of or in connection with the performance of the Work, including but not limited to any hazardous or toxic waste, substance, or constituent of any substance subject to regulation under CERCLA, RCRA, TSCA, and other Federal and state authorities that is spilled, released, threatening to release, or disposed of or destroyed by the Contractor or its Subcontractors on or off the site of the Project or while in transport to or from the site; or



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- d) any violation or alleged violation of laws and regulations, arising out of or in any way connected with the Work,

caused in whole or in part by the Contractor, any Subcontractor or supplier or any representatives of the Contractor. The Contractor shall not be required to indemnify the Owner against losses resulting from a breach of this Agreement by the Owner or its other agents and contractors, or resulting from negligence, misconduct or violation of laws on the part of the Owner or its other agents and contractors.

The Contractor further agrees to obtain, maintain, and pay for such liability insurance coverages and endorsements as will insure the provisions of this paragraph. Furthermore, the Contractor agrees to be liable for and to indemnify and reimburse the Owner for all legal fees and disbursements paid or incurred to enforce the provisions of this paragraph. The indemnification obligations under this paragraph shall not be limited in any way by the amount or type of damages, compensation or benefits payable under worker's compensation acts, disability benefit acts, other employment benefit acts, or the amount of insurance carried or recovered.

The Owner acknowledges that hazardous or toxic waste, material, chemicals, compounds or substances, or other environmental hazards, contamination or pollution, (referred to hereinafter as "environmental hazards") may be present at the Project site that were not created, generated, or released at the Project site by the Contractor or its Subcontractors, agents or employees, acting alone or in concert with others. Unless the remediation, abatement or handling of such environmental hazards is part of the scope of the Work under this Agreement, then upon the discovery of such environmental hazards, the Contractor shall immediately, and in no event more than three days later, give notice to the Owner of the environmental hazards before they are disturbed. The Owner and the Designer shall thereupon promptly investigate the environmental hazards, and make such changes in the Drawings and/or Specifications as they may find necessary to abate, remediate, isolate or handle the environmental hazards. Any increase or decrease in the Contract Price or the Contract Time resulting from such changes shall be adjusted in the manner provided herein for adjustments as to extra and/or additional Work and changes. It is agreed that the Contractor shall have no liability under this Agreement for any environmental hazards existing prior to the date that Work commences under this Agreement unless the Contractor or its Subcontractors, agents or employees, acting alone or in concert with others, by their own negligence or misconduct, release or expose the Owner or third parties to the environmental hazards.

The provisions of this paragraph shall survive the termination or cancellation or completion of this Agreement.

### **ARTICLE 6. OTHER RECORD DOCUMENTS AND SUBMITTALS**

- 6.1 The Designer shall furnish to the Contractor the number of copies of Drawings and Specifications stated in the Supplementary General Conditions. Additional copies of Drawings and Specifications may be obtained at the cost of reproduction and handling.



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- 6.2 The Contractor shall submit to the Designer all Submittals required by the Contract Documents. The Contractor shall submit three (3) reproducible prints of all shop drawings plus the number of copies sufficient for his requirements. The Contractor shall submit samples in quantities required by the Contract Documents. The Contractor shall submit product data in five (5) copies, plus the number of copies sufficient for the Contractor's requirements. All shop drawings shall be reviewed by the Contractor and shall bear the Contractor's stamp of approval before being forwarded to the Designer. Submittals shall be submitted in such time as to cause no delay to the Work or any part thereof and in accordance with the Contract Construction Schedule and Submittal Register. The Designer shall review the submittal with reasonable promptness, noting desired corrections, if any. The Designer shall retain two (2) copies of the submittal and shall return the balance of the reviewed submittal to the Contractor for action. The Contractor shall furnish any corrected submittal to the Designer. The Designer shall retain two (2) copies of the corrected submittal and will return the balance of the reviewed submittal to the Contractor.

No substitutions will be accepted after the bids have been received. All substitutions prior to the receipt of bids shall be in accordance with the Contract Documents. Refer to Instructions to Bidders, Paragraph 3, Substitutions.

The Contractor acknowledges that the processing of shop drawings and other submittals is directly impacted by the clarity, completeness, and accuracy of said documents and that it is the Contractor's responsibility to (i) review and coordinate each submittal with all other related or affected Work and (ii) approve each submittal before submitting same to the Designer for approval.

- 6.3 No substitutions and no deviations from any requirement of the Contract Documents shall be deemed allowed unless the Contractor has specifically informed the Designer and the Owner in writing of such deviations at the time of submittal and the Designer and the Owner have given written and specific approval to the substitutions or deviations. In proposing a deviation or substitution the Contractor warrants to the Owner, notwithstanding any review, allowance or approval by the Designer or the Owner that the deviation or substitution is at least equal to or better in quality and for the purpose intended, and that Contractor shall not by reason of any such review, allowance or approval be relieved from any obligation or responsibility contained in the Contract Documents.
- 6.4 Review of submittal by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with terms or designs of the Contract Documents nor from responsibility for errors of any sort in the submittal.
- 6.5 The Contractor shall keep one record copy marked "As-Built" of all Specifications, Drawings, Addenda, Modifications, and Submittals at the Project in good order and annotated at least monthly to show all changes made during the construction process. Such monthly annotations and their approval by the Designer shall be a condition precedent to approval by the Designer of each monthly Request for Payment. Said record copy shall be stored at the Project and fully protected from damage by fire or other hazard. This record copy shall be available to the Designer and Owner for inspection at all times and shall be delivered to the Designer for the Owner's purposes prior to the Designer's certifying Substantial Completion of the Work.





## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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- 6.6 At completion of the Project and before Final Payment, the Contractor shall assemble and deliver to the Owner one complete set of all as-built drawings and one complete set of all approved submittals, product data, and samples which were reviewed by the Designer. These drawings and submittals shall be on paper, or in electronic or other media if required by the Supplementary Conditions. These drawings and submittals shall be categorized and packaged as directed by the Designer.

### ARTICLE 7. CONTRACTOR

- 7.1 The Contractor shall supervise and direct the Work efficiently and with the Contractor's best skill and attention. Except as may be set forth specifically in the Contract Documents, the Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs in connection with the Work. The Contractor shall be responsible to see that the finished Work complies accurately with the Contract Documents.

- 7.2 The Contractor shall appoint a Project Manager and shall keep on the Project at all times during its progress a competent Resident Superintendent and necessary assistants who shall not be replaced without prior written approval by the Owner except under extraordinary circumstances, in which event immediate written notice shall be given to the Designer and the Owner. The Project Manager and the Resident Superintendent may be the same person or different persons. At any time, the Owner, in its sole and absolute discretion, may require the Contractor to replace the Project Manager or Resident Superintendent with an experienced and competent person or persons upon seven (7) days written notice from the Owner to the Contractor. Such replacement shall be at the Contractor's expense and at no cost to the Owner.

Both the Project Manager and the Resident Superintendent shall have authority to act on behalf of the Contractor, and instructions, directions or notices given to either of them shall be as binding as if given to the Contractor.

- 7.3 The Contractor shall provide sufficient competent and suitably qualified personnel, equipment, and supplies to lay out the Work and perform construction as required by the Contract Documents. The Contractor will at all times maintain good discipline and order at the site, and will comply with all applicable OSHA standards.

Any person employed by the Contractor, any Subcontractor, or any sub-subcontractor who, in the opinion of the Designer or the Owner, does not perform his Work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Owner or Designer, be removed forthwith by the Contractor, Subcontractor, or sub-subcontractor employing such person without cost to the Owner, and shall not be employed again in any portion of the Work without the written approval of the Owner or Designer.

Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper prosecution of the Work within three (3) days after written order, the Owner may withhold further payment by written notice until compliance with such order.



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- 7.4 If, in the opinion of the Designer or the Owner, any Subcontractor on the Project is incompetent or otherwise unsatisfactory, he shall be replaced by the Contractor with no increase in the Contract Price if and when directed by the Designer or the Owner in writing.
- 7.5 The Contractor shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools appliances, fuel, light, heat, and all other facilities and incidentals necessary for the execution, maintenance, initial operation, and completion of the Work, other than those specifically excluded by the Contract Documents and to be furnished by the Owner or others. When use or storage of hazardous materials or equipment or methods of more than ordinary risk are necessary in accomplishing the Work, the Contractor shall give the Owner and Designer reasonable advance notice.

If any materials are to be furnished or installed by the Owner or others under the terms of the Contract Documents, said materials shall be made available to the Contractor at the location(s) specified in the Contract Documents. All costs of handling, transportation from the specified location to the Project, storage, and installing of Owner-furnished materials shall be included in the Contract Price. The Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies which may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner shall deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good any such damage, loss, or deficiency.

All equipment which is proposed to be used in the Work shall be of sufficient size and in such mechanical condition as to meet the requirements of the Work and produce a satisfactory quality of work. Equipment used on any portion of the Work shall be such that no injury to previously completed Work, adjacent property, or existing facilities shall result from its use.

When the methods and equipment to be used by the Contractor accomplishing the Work are not prescribed in the Contract Documents, the Contractor shall be free to use any methods or equipment that will accomplish the Work in conformity with the requirements of the Contract Documents.

When the Contract Documents specify the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Designer. If the Contractor desires to use a method or type of equipment other than specified in the Contract Documents, the Contractor may request authority from the Designer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it shall be on the condition that the Contractor shall be fully responsible for producing Work in conformity with the requirements of the Contract Documents. If, after trial use of the substituted methods or equipment, the Designer determines that the Work produced does not meet the requirements of the Contract Documents, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining Work with the specified methods and equipment at no additional cost to the Owner. The Contractor shall remove any deficient Work and replace it with Work of specified quality, or take such other corrective action as the Designer may direct. No change in the Contract Price or in Contract Time shall be made as a result of authorizing a change in methods or equipment under this paragraph.



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- 7.6 All materials and equipment shall be new, except as otherwise provided in the Contract Documents. When special makes or grades of material which are normally packaged by the supplier or manufacturer are specified or approved, such materials shall be delivered to the Project site in their original packages or containers with seals unbroken and labels intact.
- Materials shall be so stored as to assure the preservation of their quantity, quality and fitness for the Work. Stored materials, even though approved before storage, may again be inspected by the Designer or Owner prior to their use in the Work and shall meet the requirements of the Contract Documents at the time they are incorporated into the Work. Stored materials shall be located so as to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Designer and the Owner. Materials to be stored at the Project or on the Owner's property shall not create an obstruction to the Owner's or other contractor's reasonable activities. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the Owner a copy of the property owner's permission. All storage sites on private or the Owner's property shall be restored to their original condition by the Contractor at his entire expense, except as otherwise agreed to (in writing) by the owner or lessee of the property.
- 7.7 All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, or processor, except as otherwise provided in the Contract Documents.
- 7.8 The Contractor will be fully responsible for all acts and omissions of his Subcontractors and of persons directly or indirectly employed by them and of persons for whose acts any of them may be liable to the same extent that the Contractor is responsible for the acts and omissions of the Contractor's own employees. Nothing in the Contract Documents shall create any contractual relationship between any Subcontractor or supplier and the Owner or the Designer, or any obligation on the part of the Owner or the Designer to pay or see to the payment of any money due any such Subcontractor or material furnisher except as may otherwise be required by law. The Owner or the Designer may furnish to any Subcontractor or supplier, to the extent practicable, evidence of amounts paid to the Contractor on account of specific Work done.
- 7.9 The divisions and sections of the Specifications and the identifications of any Drawings shall not control the Contractor in dividing the Work among Subcontractors.
- 7.10 The Contractor agrees to bind specifically every Subcontractor to the terms and conditions of the Contract Documents for the benefit of the Owner and to furnish written evidence thereof to the Designer and the Owner within seven (7) days after written request by the Owner.
- 7.11 The Contractor shall attend job progress conferences and all other meetings or conferences as directed by the Designer. The Contractor shall be represented at these job progress conferences by a representative having the authority of the Project Manager and by such other representatives as the Designer may direct. Job progress conferences shall



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be open to Subcontractors, suppliers and any others who may contribute beneficially toward maintaining required job progress, and such personnel shall be encouraged by the Contractor to attend. It shall be the principal purpose of job progress 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 Work and the Project by the specified Completion Dates. The Contractor shall be prepared to assess progress of the Work as required in the Contract Documents and to recommend remedial measures for correction of progress as may be appropriate. The Designer shall preside as chairman and arrange for minutes to be taken and circulated.

In the event that the prosecution of the Work is discontinued for any reason, the Contractor shall notify the Designer and the Owner at least forty-eight (48) hours in advance of resuming operations.

Should the terms of the Contract Documents require completion of one or more portions of the Work for the Beneficial Occupancy of the Owner prior to completion of the entire Work, the Contractor shall complete such portion(s) of the Work on or before the date specified. Such completion shall include the obtaining of all government or other permits, permission, and/or approvals necessary to occupancy. The Contractor shall independently estimate the difficulties involved in arranging the Work to permit such Beneficial Occupancy and shall not claim any additional compensation or time extension by reason of any delay or increased cost due to completing such portion(s) of the Work. The Owner's possession and use of such portion(s) of the Work shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents. The Owner shall be responsible for the security, maintenance, utilities, and insurance of all portions of the Work completed and beneficially occupied by the Owner.

- 7.12 The Contractor shall pay all license fees and royalties, and assume all costs incident to the use of any invention, design process, or device which is the subject of patent rights or copyrights held by others, except for inventions, design processes, or devices specified by the Designer in the Contract Documents. The Contractor shall indemnify and hold harmless the Owner, the Designer, and anyone directly employed by either of them, from and against all claims, damages, losses and expenses, including attorney's fees and costs of defense, arising out of any infringement or alleged infringement of such rights during or after completion of the Work, and shall defend all such claims in connection with any actual or alleged infringement of such rights.
- 7.13 The Contractor shall secure and pay for all permits, including without limitation construction permits and licenses, and will pay all governmental charges and inspection fees necessary for the prosecution of the Work.
- 7.14 The Contractor shall give all notices and comply with all laws, ordinances, rules, and regulations applicable to the Work and shall protect and indemnify the Owner and the Owner's officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or by the Contractor's employees, Subcontractors, sub-subcontractors, or their employees.



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- 7.15 The Contractor shall be responsible for the entire site of the Project and for its reasonable and necessary protection and security, as required by laws or ordinances governing such conditions, or by custom or sound construction practices, and shall share such responsibilities as may be agreed upon among them, or in the absence of such agreement, as may be directed by the Contract Documents, Owner, or Designer. The Contractor shall be responsible for any damage to the Owner's property, or that of others, by the Contractor or the Contractor's employees, Subcontractors, sub-subcontractors, or their employees or agents, and shall make good such damages. The Contractor shall be responsible for and pay for any such claims against the Owner.
- 7.16 The Contractor shall protect all landscaping designated to remain in the vicinity of the operations and barricade all walks, roads, and areas as necessary to keep the public away from the construction.
- 7.17 The Contractor shall provide cover and/or protect all portions of the Work and provide all materials necessary to protect the Work whether performed by the Contractor or any of the Subcontractors or sub-subcontractors. 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 or extension to the Contract Time.

The Contractor shall maintain the Work during construction and until the Work is accepted. This maintenance shall constitute continuous and effective effort prosecuted day by day, with adequate equipment and forces so that the Work is maintained in satisfactory condition at all times. All costs of maintenance shall be included in the Contract Price and the Contractor will not be paid an additional amount for such effort. Should the Owner or Designer observe that the Contractor at any time has failed to maintain the Work as provided herein, the Designer may immediately notify the Contractor of such non-compliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. Should the Contractor fail to properly respond to the Designer's notification, the Owner may, at the Contractor's expense, take such action as it may deem appropriate to remedy the defective maintenance, including suspension of the Contractor's Work or any part thereof. Any such expense incurred by the Owner shall be deducted from monies due or to become due the Contractor.

Parking lots, streets, and walks connecting to the Project area shall be protected by the Contractor from deposits of mud, sand, stone, litter, or debris in any form.

Pedestrian traffic areas around the construction limits must be maintained in a clean and safe condition at all times with required barricades and covered walkways. When excavation or other operations outside the Project limits is required, the Contractor shall, immediately following that work, return the area to its original condition.

All catch basins and storm drain lines in the vicinity of the Project site shall be protected at all times from entry of dirt, rubble and other debris. The residue from the cleaning of trucks, wheelbarrows, concrete buggies, etc. must be prevented from entering the drainage system, and if cleaning is done, the residue must be contained and removed from the Project site with other refuse.



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- 7.18 No burning of refuse or debris shall be allowed inside or around the Project during the course of construction without written authority from authorities having jurisdiction and the Owner.
- 7.19 The Contractor shall provide for and maintain necessary safety measures and safety programs for the protection of all persons involved with the Work. Such measures and programs shall include the requirements of the most current edition of the CAGC Safety and Health Manual [or the AGC Accident Prevention Manual in Construction], or equivalent requirements, and shall fully comply with all Federal, State, and local laws, rules, regulations, and building code requirements relating to the prevention of accidents or injuries to persons on or about the location of the Work.
- All trenches, excavations, or other hazards in the vicinity of the Work shall be well barricaded, and properly lighted at night. When Work requires closing of an area normally used by the Owner or the public, the Contractor shall furnish, erect, and maintain temporary barricades, and properly light the area. The Contractor shall comply with any directions and public authorities in this respect.
- 7.20 The Contractor shall designate a responsible officer or employee as safety inspector, whose duties shall include accident prevention on the Project as well as implementation of the Contractor's safety measures and safety programs on the Project. The name of the safety inspector shall be made known to the Designer and the Owner at the pre-construction conference.
- 7.21 In emergencies affecting the safety of persons, the Work, or property at the Project site or adjacent thereto, the Contractor is obligated to act in the Contractor's discretion to prevent threatened damage, injury, or loss. As soon as practicable, the Contractor shall notify the Designer and Owner of such emergency. The Contractor shall give the Designer and the Owner prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused by such emergency. If the Contractor believes that additional work done in an emergency entitles the Contractor to an increase in the Contract Price or an extension of the Contract Time, the Contractor may make a claim therefore as provided in Articles 14 and/or 15.
- 7.22 The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by the Work. At least weekly and at the completion of the Work, the Contractor shall remove all waste materials and rubbish from and about the Project. At the completion of the Work, the Contractor shall remove all tools, construction equipment, machinery, and surplus materials. The Contractor shall leave the Work in condition for occupancy by the Owner such that no cleaning or other operations are required. Material cleared from the Project and deposited on adjacent property shall not be considered as having been disposed of satisfactorily. If the Contractor fails to keep the Project clean of waste materials or rubbish, fails to satisfactorily clean-up weekly or at the completion of the Work, the Owner may do so and the costs thereof may be deducted from any amounts due the Contractor.
- 7.23 Utilities, temporary facilities, and signs shall be provided as described in the Contract Documents. Absent a contrary direction in the Supplementary Conditions, the Contractor shall pay all bills for water, electricity, or other public utility service to the Project site.



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7.24 The Contractor shall indemnify and hold the Owner, the Designer, the Designer's consultants, and their officers, agents, and employees harmless against all costs, damages, and expenses, including attorney's fees and costs of defense, arising out of claims by any separate contractor or by any Subcontractor, sub-subcontractor, or supplier engaged by or employed by the Contractor or employed by any of the Subcontractors claiming through him, including without limitation damages, losses, and expenses arising out of or relating to any inconvenience, delay, interference, or other action or non-action of the Contractor or the Contractor's Subcontractors on the Project.

The Contractor acknowledges that should the Contractor or any of the Contractor's Subcontractors be damaged by any breach of contract by any other separate prime contractor on the Project, the Contractor may invoke applicable dispute resolution procedures with said other separate prime contractor or bring a direct civil action against said other separate prime contractor. The Contractor hereby expressly agrees that neither the Owner nor its officers, agents, or employees shall have any liability of any kind or nature whatsoever to the Contractor, its Subcontractors, sub-subcontractors, or suppliers arising out of or relating to any breach, inconvenience, delay, interference, or other action or non-action by any other separate prime contractor. The Contractor covenants not to sue the Owner for any loss or damage caused by any breach, inconvenience, delay, interference, or other action or non-action by any other separate prime contractor, notwithstanding whatever rights at law the Contractor might have to bring a civil action against the Owner for any breach, inconvenience, delay, interference, or other action or non-action of any other separate prime contractor. The Contractor agrees to look exclusively to the other prime contractor for relief or remedy.

Nothing contained herein or appearing anywhere in the Contract Documents shall obligate or require the Owner to exercise any right or privilege, or to take any action or to refrain from taking any action under any contract it may have with any other prime contractor or party to the Project for the benefit of the Contractor or any Subcontractor, sub-Subcontractor, or supplier claiming through the Contractor.

7.25 Prior to completion of the Work and Final Payment of the Contract Price, excepting only those portions of the Work deemed accepted in accordance with the Contract Documents, the Contractor shall have charge and care of the Work, and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work. The Contractor shall as required by the Owner replace, rebuild, repair, restore, and make good all injury or damage to any portion of the Work occasioned by any of the above causes before Final Completion and shall bear the expenses thereof.

7.26 In the event that the Work, or any portion thereof, is suspended at any time pursuant to an order of the Owner, the Contractor shall obey all instructions of the Owner regarding storage of materials, drainage, protection of the Work, and erection of temporary structures during the suspension period.

7.27 The Project Expediter for the Project shall be responsible for the coordination of the Work of itself and any other separate contractors, both as to space and time. The Project Expediter shall coordinate the implementation of the Contract Construction Schedule, all



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construction activities and close-out of the Project, including but not limited to all testing, inspection, certifications, and approvals required by public agencies.

The Contractor and the Project Expediter shall each be required to notify the Designer and the Owner promptly of any event or condition which could affect the conduct or progress of the Work and shall cooperate fully with all other contractors on the Project site.

- 7.28 The Owner hereby delegates to the Project Expediter all of its duties to coordinate and to expedite the Work not expressly reserved to the Owner by other provisions of the Contract Documents.
- 7.29 All Work performed pursuant to the Contract Documents shall conform in all respects to the North Carolina State Building Code and all other state, local, and national codes in effect at the time of and applicable to this Work.
- 7.30 The Contractor shall provide for and maintain necessary safety measures and safety programs for the protection of all persons at the Project site, and shall comply at all times with the requirements of the most current edition of the CAGC Safety and Health Manual [or the AGC Accident Prevention Manual in Construction], or the equivalent requirements of the Contractor's safety program, and shall fully comply with all Federal, State, and local laws, rules, regulations, and building code requirements so as to prevent accidents or injuries to persons on or about the Project site. The Contractor shall clearly mark or post signs warning of existing hazards, and shall barricade excavations, elevator shafts, stairways, and similar hazards. The Contractor shall protect against damage or injury resulting from falling materials, and shall maintain all protective devices and signs throughout the progress of the Work.
- 7.31 The Contractor shall adhere to the rules, regulations, and interpretations of the North Carolina Department of Labor's Occupational Safety and Health Standards for the Construction Industry (29 CFR Part 1926 as adopted in 13 NCAC 07F.0201, including 29 CFR Part 1910 General Industry Safety and Health Standards applicable to construction) and N.C. Gen. Stat. §95-126 through 155 (Occupational Safety and Health) as well as all revisions and amendments to such standards or statutes as may occur throughout the performance of the Work.
- 7.32 Any land disturbing activity performed by the 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 NCAC 4A, 4B, and 4C), and as may be revised or amended in the future. Upon receipt of notice that a land-disturbing activity is in violation of said Act, the Contractor shall be responsible for ensuring that all steps or actions necessary to bring the Project in compliance with said Act are promptly taken. The Contractor shall be responsible for all penalties assessed pursuant to N.C. Gen. Stat. 113A-64 with respect to its Work, and shall indemnify and hold harmless the Owner from all costs and expenses, including attorney's fees and costs of defense arising out of or related to the enforcement of the Act against any party or person described in this Article.





## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

- 7.33 Any mechanical or electrical work such as sleeves, inserts, chases, etc. located in the Work of the Contractor for general work shall be built in by that Contractor. On multiple prime projects, the mechanical and electrical contractors shall set all sleeves, inserts, and other devices built into the structure in cooperation and under the supervision of the Contractor for general work. The responsibility for exact location of such items shall be that of the mechanical, plumbing, or electrical prime contractor.
- 7.34 The Contractor shall be responsible for permanently fixed service facilities and systems in use during progress of the Work and shall strictly adhere to the following procedures:
- a) Prior to acceptance of the Work by the Owner, the Contractor shall remove and replace any part of the permanent building systems damaged through use during construction.
  - b) Temporary filters shall be installed in each of the heating and air conditioning units, return air grilles, and other locations to prevent intrusion of dust, dirt, and debris during construction. Temporary filters shall be removed and replaced with new filters immediately prior to Substantial Completion.
  - c) Extra effort shall be maintained to keep the building clean and under no circumstances shall air systems be operated if finishing operations are creating dust in excess of what would be considered normal if the building were occupied.
  - d) When the permanent lighting system is used during construction, lamps shall be replaced and shall be new on the date of Substantial Completion.

### **ARTICLE 8. OWNER**

- 8.1 The Owner shall issue communications and notices to the Contractor through the Designer to the extent contemplated by the Contract Documents.
- 8.2 In case of termination of the employment of the Designer, the Owner shall appoint as Designer a qualified person who shall have and assume all rights and duties held by the original Designer.
- 8.3 The Owner shall have the right to take possession of and use any portion of the Work notwithstanding the fact that the time for completion of such portion of the Work may not have expired, but such taking possession and use shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents.
- 8.4 A waiver on the part of the Owner of any breach of any part of the Contractor shall not be held to be a waiver of any other or subsequent breach.
- 8.5 The Owner shall pay all permanent acreage fees, governmental impact fees, and meter deposits for permanent utilities.

### **ARTICLE 9. CONSTRUCTION MANAGER**



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- 9.1 The Owner may employ one or more Construction Managers for the purpose of assisting the Owner, Designer, and Contractor in developing and administering budgets and cost controls, in evaluating constructability and value engineering proposals, in establishing and maintaining a critical path method (CPM) schedule, in coordinating and/or expediting the Work with other projects being constructed by the Owner or others adjacent or near the Work, or for such other purposes as the Owner may deem appropriate. From time to time the Owner may identify such Construction Managers(s) to the Contractor in writing identifying any tasks assigned to such Construction Managers(s).

### **ARTICLE 10. DESIGNER**

- 10.1 The Designer is charged with the responsibility of interpretation of the Contract Documents. The Designer's decisions relating to aesthetic matters shall be final.
- 10.2 All Work completed under the Contract Documents shall be subject to review by the Designer. No Work is to be covered without the Designer's review or prior authorization. Any Work so covered without the Designer's review or prior authorization shall be uncovered at the Contractor's expense. The Contractor shall notify the Designer in writing at least twenty-four (24) hours in advance of covering any Work.
- 10.3 The Designer shall not be responsible for the construction means, methods, techniques, sequences, procedures, or the safety precautions and programs incident thereto, and shall not be responsible for the Contractor's failure to perform the Work in accordance with the Contract Documents, but shall be entitled to enforce any requirements in the Contract Documents specifying particular means, methods, techniques, sequences, or procedures.
- 10.4 The Designer shall be an Owner's representative during the construction period. The duties, responsibilities and authority of the Designer as the Owner's representative during construction are as set forth in the Contract Documents.

### **ARTICLE 11. TESTING AND SURVEYING**

- 11.1 Laboratory and field tests to determine compliance of construction with the Contract Documents shall be made by the Owner or testing consultants employed by the Owner except those required elsewhere in the Contract Documents to be paid for by the Contractor. The costs and expenses of providing samples for and assistance in any testing shall be borne by the Contractor and are included in the Contract Price. Any Work in which untested materials are used without approval or written permission of the Designer shall be removed and replaced at the Contractor's expense. Work found to be unacceptable or unauthorized will not be paid for and, if directed by the Designer shall be removed and replaced at the Contractor's expense. Unless otherwise designated, tests in accordance with the cited standard methods of ASTM or other generally recognized or specifically authorized methods which are current on the date of advertisement for bids shall be made at the expense of the Owner; provided, however, in the event that after such testing any Work is found to be defective or does not meet the requirements of the Contract Documents, the costs of retesting such Work and the costs of inspection services shall be paid by the Contractor. Samples shall be taken by a testing laboratory employed by the Owner. All materials being used are subject to inspection, tests, or rejection at any time prior to or during incorporation into the Work. Copies of all Owner test reports will be



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furnished to the Contractor at his written request. Copies of Contractor test reports shall be furnished to the Designer upon written request.

11.2 The Owner shall have the right to deduct the costs of additional testing as described in paragraph 11.1 from any money due the Contractor; or if no money is due the Contractor, the Owner shall have the right to recover these costs from the Contractor, from its sureties, or from both.

11.3 All layouts and surveying shall be accomplished by properly qualified personnel duly licensed in the State of North Carolina.

### **ARTICLE 12. SEPARATE CONTRACTS**

12.1 It is expressly understood that the Owner may deploy the Owner's own employees or engage other separate prime contractors to perform Work as a part of the Project whose work will be performed simultaneously and sequentially with the performance of the Work by the Contractor. It shall be necessary for the Contractor to coordinate construction activities with such other contractors, particularly with respect to access to work areas, storage of materials, and use of elevators and other common facilities. The Contractor shall diligently and in good faith cooperate with the Owner, the Designer, and all other contractors with respect to such matters and shall regularly and faithfully attend any and all meetings called by the Owner or the Designer with respect to such matters. Any disputes between the Contractor and any other separate prime contractor with respect to such matters shall be resolved in accordance with the claim and dispute resolution procedures in the Agreement.

### **ARTICLE 13. CONTRACT TIME**

13.1 Within fourteen (14) days after receipt of the Construction Agreement by the Contractor for signatures, the Project Expediter shall prepare and submit to the Designer and Owner for review and approval a preliminary progress schedule for the Work pursuant to the requirements stated in the Contract Documents.

13.2 Within fourteen (14) days after initial receipt of the Construction Agreement for signatures the Contractor shall submit to the Designer a Submittal Register listing all Submittals the Contractor is required to make or proposes to make under the Contract Documents, the dates on which the Contractor proposes to make such Submittals and the dates by which the Contractor reasonably requires a response from the Designer with respect to each Submittal. The dates submitted shall be incorporated into the Contract Construction Schedule as Completion Dates when they have been approved or modified by the Owner. The Designer shall not be required to review any Submittal from the Contractor until a Submittal Register acceptable to and approved by the Owner has been submitted by the Contractor.

13.3 Not later than thirty (30) days following execution and delivery of the Construction Agreement by Owner to Contractor, the Owner shall deliver to the Contractor a Notice to Proceed. The Notice to Proceed shall state a commencement date on which it is expected that the Contractor will begin the Work to be performed under the Agreement. The Contract Time shall be measured from said specified commencement date. The commencement



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date stated in the Notice to Proceed shall not be earlier than three (3) days after the Notice to Proceed is served on the Contractor.

If, other than by mutual agreement, said specified commencement date is more than thirty (30) days after the date of execution and delivery of the Agreement from Owner to Contractor and the Contractor believes said delay justifies an increase in Contract Price and/or an extension of Contract Time, the Contractor may make a claim therefore as provided in Article 14 and/or Article 15.

No Work shall be done prior to the date specified in the Notice to Proceed.

A final Contract Construction Schedule shall be submitted for approval by the Contractor, Designer, and Owner no later than fourteen (14) days after Notice to Proceed. No payments shall be due the Contractor until this schedule is approved by all parties.

- 13.4 The Contract Construction Schedule is a Contract Document. The Contractor represents that the Contract Construction Schedule has been reviewed in detail, that the Contractor participated in its preparation, that all of the activities which impact, limit, or otherwise affect the time of completion of the Work are shown in the Contract Construction Schedule and that all of the activities of others which impact, limit, or otherwise affect the start, duration, or completion of the Contractor's activities are also shown. The Contractor further represents that the Contractor can and will complete each activity within the time shown for that activity. Time is of the essence with respect to each such activity and Completion Date.
- 13.5 If the Contractor submits a construction schedule, progress report, or any other document that indicates or otherwise expresses an intention to achieve completion of the Work prior to any Completion Date required by the Contract Documents or prior to expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.
- 13.6 If the Contractor, for reasons beyond the Contractor's control, is delayed in beginning any activity, the Contractor shall, nevertheless, have the same number of days as is shown in the Contract Construction Schedule for the activity, and the affected activity and any succeeding activity that is dependent upon that activity shall be adjusted accordingly; provided that at any time the Owner, by means of a Change Order, may require the Contractor to work overtime, to increase labor forces or to take any necessary or appropriate action to decrease the time required for any activity, and the Contractor shall be entitled to an adjustment in the Contract Price computed in accordance with Article 15 of these General Conditions.
- 13.7 At any time, the Owner may order the Contractor, on seven (7) days written notice, to begin any activity earlier than the starting date shown on the Contract Construction Schedule.
- 13.8 Should the Contractor fail to start any activity on the start date shown in the Contract Construction Schedule or as it may have been adjusted in accordance with paragraphs 13.5 or 13.6 above, or become delayed, the Contractor shall, without being entitled to any increase in the Contract Price or other compensation, work overtime, increase labor forces or take such other action as may be necessary or appropriate to complete the activity by



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the Completion Date shown on the Contract Construction Schedule, or as such Completion Date may have been adjusted.

- 13.9 The Designer and Owner or his Construction Consultant shall monitor progress of the Work at all times and the Contractor shall cooperate with such monitoring and provide any and all information with respect to the progress of the Work and scheduling as the Owner may reasonably require.
- 13.10 On a monthly basis, the Contractor shall revise the Contract Construction Schedule, showing any adjustments made in accordance with paragraphs 13.5 or 13.6, above, by any Change Order, the progress of the Work, and any days gained or days lost with respect to any activity, and shall furnish copies thereof to the Owner and Designer.
- 13.11 Should any monthly revision of any Contract Construction Schedule show that the Contractor is behind on any activity, the late completion of which could delay Substantial Completion of the Work, the Owner shall be entitled to withhold from the next Progress Payment due the Contractor an amount not exceeding the amount the Owner would be entitled to in Liquidated Damages, should Substantial Completion be delayed by the same number of days that the Contractor is currently behind schedule. If, subsequently, the Contractor's progress, as shown by any succeeding monthly revision to the Contract Construction Schedule, is such that the anticipated delay no longer exists, the Owner shall pay with the Progress Payment next due to the Contractor such amounts as have been withheld in accordance with this paragraph.
- 13.12 The Owner shall have the right to perform Work, hire and employ labor and craftsmen, rent equipment, subcontract with other parties, or do anything that the Owner deems necessary or appropriate to remedy or cure any delay by the Contractor in the progress of the Work. Such action by the Owner shall not, in any way, affect, void or limit any warranty, guaranty or other responsibility of the Contractor under the Contract Documents. Such action may be taken by the Owner only after three (3) days written notice to the Contractor. All costs incurred by the Owner in taking any such action shall be charged to the Contractor and deducted from any amounts remaining due under the Agreement.
- 13.13 The Contractor may be entitled to an extension of the Contract Time (but no increase in the Contract Sum) for delays arising from unforeseen causes beyond the control and without the fault or negligence of the Owner, the Contractor or the Contractor's Subcontractors as follows:
- a) Labor disputes and strikes that directly impact the critical path activities of the Contract Construction Schedule;
  - b) Acts of God, tornado, fire, hurricane, blizzard, earthquake, typhoon, or flood that damage completed Work or stored materials.
  - c) Acts of the public enemy; acts of the State, Federal, or local government in their sovereign capacities.
  - d) Abnormal inclement weather as defined in Article 13.14.



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13.14 On any day that the Contractor considers that the Project is delayed by adverse weather conditions, the Contractor shall identify in writing to the Designer and the Owner the adverse weather conditions affecting each activity, the specific nature of the activity affected, the number of hours lost, and the number of and identity (by responsibility or trade) of workers affected and shall obtain from the Designer written recognition of the delay. The time for performance of this Contract includes an allowance for a number of calendar days which may not be suitable for construction Work by reason of adverse weather. The Contract Time will be extended only if the number of calendar days of adverse weather recognized by the Designer exceeds the number of inclement weather days set forth below, and the Contractor demonstrates how this adverse weather impacts activities on the critical path of the Contract Construction Schedule.

Table with 2 columns: Month, Number of Inclement Weather Days. Rows include January (10), February (10), March (10), April (9), May (10), June (9), July (11), August (10), September (8), October (7), November (8), December (9).

13.15 If the Contractor believes that the progress of the Work has been adversely affected by adverse weather recognized by the Designer during a particular month, the Contractor shall submit a written request for extension of time to the Designer. Such a request for time extension of the Contract Time shall be submitted by the tenth (10th) day of the month following that month in which the adverse weather is encountered. The request shall include, but is not limited to, the following information:

- a) Detailed description of weather's effect on scheduled activities and its net effect on the critical path of the Project, and
b) Weather records from the official weather station nearest the Project site and records of actual observation as contained in daily reports, correspondence, or other documentation.

13.16 The Contractor specifically recognizes that a delay by the Contractor in achieving any Completion Date can have the effect of delaying the Substantial Completion of the Project, that such delay in Substantial Completion of the Project will necessarily cause damages, losses, and expenses to the Owner, including, but not limited to and by way of illustration only, increased capitalized costs and interests for the Project, increased and extended Project overhead, Designer's and Consultant's fees, increased costs of construction, increased and extended operation costs of other facilities, and inefficiency and loss of productivity, and that such damages, losses, and expenses may not be readily identifiable or ascertainable at the time they are incurred or at any time. Therefore, and in recognition



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of these factors and the likelihood that actual damages from his delay will not be readily ascertainable, the Contractor agrees to pay to the Owner, as Liquidated Damages and not as a penalty, the sum identified in the Supplemental Conditions hereto as the Liquidated Damages per Day, for each day by which the failure to meet any Completion Date shown in the Contract Construction Schedule, adjusted in accordance with this Article, delays the Substantial Completion of the Project.

- 13.17 The Contractor shall not be entitled to any adjustment in the Contract Price or other compensation from the Owner for any delay in the completion of or progress on the Work that is caused by a force majeure condition or is otherwise not caused by the sole and direct act or omission of the Owner and the Owner's employees or agents.
- 13.18 The sum for Liquidated Damages is the amount stipulated in the Supplementary General Conditions per day per Prime Contractor as Liquidated Damages reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said Contractor(s) to complete the Work within the time specified, such time being in the essence of this contract and a material consideration thereof.

### ARTICLE 14. CHANGES IN THE WORK

- 14.1 Without invalidating the Contract Documents, the Owner may, at any time, or from time to time order additions, deletions, or revisions in the Work. Said additions, deletions, or revisions shall be authorized only by written Change Orders, Construction Change Directives or Field Orders. Upon receipt of a Change Order, Construction Change Directive or Field Order, the Contractor shall proceed with the Work involved. All such Work shall be executed under the applicable conditions of the Contract Documents. If any change causes an increase or decrease in the Contract Price and/or an extension or shortening of the Contract Time, adjustments shall be made as provided in Article 14 and/or Article 15.

In order to expedite the Work and avoid or minimize delay in the Work that might affect the Contract Price or Contract Time, the Designer may issue a Change Order in the form of a Construction Change Directive which when signed by the Owner and Designer, directs the Contractor to proceed promptly with the Work involved. Any claim for an adjustment in Contract Price or Time, if not defined in the Construction Change Directive, shall be promptly made in writing in accordance with the procedures defined in Article 15.2.

- 14.2 The Designer may authorize minor changes or alterations in the Work not involving change in the Contract Price or in the Contract Time and not inconsistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order. Such alterations shall not invalidate the Contract Documents nor release the surety. If the Contractor believes that any minor change or alteration authorized by the Designer entitles him to an increase in the Contract Price and/or an extension of Contract Time, he may make a claim therefore as provided in Article 14 and/or Article 15.
- 14.3 Except in an emergency endangering life or property, no change shall be made by the Contractor except upon prior written Change Order, Directive or Field Order authorizing such Change.



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- 14.4 Increases in the Contract Price and/or extensions of the Contract Time for additional Work performed by the Contractor shall only be in accordance with a written Change Order signed by the Owner and Designer. The Contractor shall not be entitled to additional time or to additional compensation for any Work performed or material supplied which is claimed to have been authorized or settled by an "oral" change, or by a "constructive" or "implied" change, or by a course of conduct, or by any action or non-action by the Owner, Designer, or any other persons, or by any means whatsoever other than by a written Change Order for such Work or material signed by the Owner and the Designer.
- 14.5 Changes in the Work resulting from emergency shall not invalidate the Contract Documents nor release the surety.
- 14.6 Neither the Owner nor the Designer shall be responsible for verbal instructions which have not been confirmed in writing, and in no case shall such instructions be interpreted as permitting a departure from the Contract Documents unless such instruction is confirmed in writing and supported by a proper Change Order, Construction Change Directive or Field Order, whether or not the cost is affected.
- 14.7 The Owner, in its sole discretion, may require that the Contractor notify the Contractor's sureties of any changes affecting the general scope of the Work or change in the Contract Price, and that the amount of applicable bonds shall be adjusted accordingly. If this requirement is exercised, the Contractor shall furnish proof of such adjustment to the Designer and the Owner.

If this requirement is exercised, the Change Orders shall require written consent of the Contractor's surety. At the time of signing a Change Order, the Contractor shall be required to certify as follows:

"I certify that all sureties have been notified that my contract has been altered by the amount of this Change Order, and that a copy of the approved Change Order will be mailed to all sureties upon its receipt by me."

If this requirement is exercised, no payment to the Contractor on account of any Change Order shall become due or payable until written evidence of the surety's consent to the Change Order has been furnished to the Designer and to the Owner, and the furnishing of such written consent is a condition precedent to such payment.

- 14.8 The Contractor shall support all requests for Change Orders with a detailed cost breakdown showing cost of materials, labor, equipment, transportation, other items, Contractor's overhead and profit, and total cost, in accordance with methods defined in this Article, and, if the request seeks an extension of the Contract Time, with a time-related diagram which demonstrates specifically why an increase in construction time is needed.
- 14.9 When a request for a Change Order involves a Subcontractor, the Contractor shall provide quotation from same on Subcontractor's letterhead. The Subcontractor's quote shall list materials, equipment, and labor separately, and show overhead and profit in the manner provided in paragraph 14.8.

### ARTICLE 15. CHANGE OF THE CONTRACT PRICE





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15.1 The Contract Price constitutes the total compensation payable to the Contractor for performing all Work under the Contract Documents. All duties, responsibilities, and obligations assigned to or undertaken by the Contractor shall be at his expense without change in the Contract Price. The Contract Price may only be changed by a Change Order.

15.2 Any claim for an adjustment in the Contract Price shall be in writing and written notice of any event, action, or non-action which may become the basis of a claim shall be delivered to the Owner and the Designer within three (3) days of the occurrence, or the beginning of the occurrence, of any such event, action or non-action giving rise to the claim. Such written notice is a condition precedent to the making of a claim, and such notice shall describe the basis of the potential claim with reasonable detail and clarity.

A claim shall be made in writing and shall be delivered to the Designer and the Owner no later than fourteen (14) days after such notice. The claim shall describe in detail the basis for the claim, with specific reference to any provisions of the Contract Documents, by paragraph, drawing number, or other specific identification, and shall state the amount claimed and how it is calculated. If the Contractor, at the time the claim is made, is unable to state the amount claimed with accuracy, the Contractor shall so state and provide the estimated amount and the basis on which the amount is to be calculated. At the earliest date practicable, but in no event more than thirty (30) days after Contractor's notice of claim, the Contractor shall supplement the claim with an accurate statement of the amount claimed and how it has been calculated. The Contractor shall provide, in writing, in support of the claim all such explanations, arguments, data, receipts, expert opinions, or other documents or information as the Contractor deems appropriate to be considered in support of the claim. A claim may properly be rejected by the Owner by reason of the Contractor's failure to submit adequate or accurate documentation or information, except that within seven (7) days after being given notice that the claim has been rejected on this basis, the Contractor may submit additional documentation or information. No claim for a change of the Contract Price shall be considered or granted (except solely at the discretion of the Owner) unless a claim is so made, nor shall the Contractor be entitled to any increase in the Contract Price unless the Contractor has given notice and made such a written claim within the times required. The Owner shall decide, after obtaining the advice of the Designer, whether an increase in Contract Price is warranted, and the amount of such increase shall be determined as provided in paragraph 15.4 through 15.5, below. Any change in the Contract Price resulting from any such claim shall be incorporated in a Change Order.

The Owner shall advise the Contractor of its decision with respect to the claim within fourteen (14) days of its receipt, or of the receipt of additional documentation or information if the absence of such has previously been the basis of rejection of the claim; provided, however, that if, in its sole discretion, the Owner deems that review or consideration of any part of the claim or any matter related thereto by its governing Board is necessary or appropriate, it shall so advise the Contractor and shall provide its decision to the Contractor within seven (7) days after such Board consideration, review or action. Any claim on which the Owner has not provided its decision to the Contractor within the applicable time period shall be deemed denied.



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If the Contractor is not satisfied with the decision of the Owner, the Contractor may within seven (7) days of receipt of the Owner's decision initiate the mediation process as described in Appendix A to the General Conditions of the Contract for Construction.

15.3 In determining the amount of a Contract Price adjustment, the parties shall apply the following methods, as appropriate:

(A) Change in Work: The Owner and Contractor shall negotiate in good faith and attempt to agree upon the value of any change (extra or decrease) in Work prior to the issuance of a Change Order covering said Work. Such Change Order shall set forth the corresponding adjustment to the Contract Price. In the event the Owner and the Contractor are unable to agree, the Owner shall grant an equitable adjustment in the Contract Price.

(B) Emergency Work: In the event of emergency endangering life or property, the Contractor may be directed by the Designer to proceed on a time and material basis, whereupon the Contractor shall so proceed and keep accurately, in such form as may be required by the Designer, a correct account of costs together with all proper invoices, payrolls, and supporting data therefore.

15.4 Where the Contract Price is to be adjusted, the following limitations shall apply in determining the amount of adjustment:

(A) In the case of extra or emergency work, the Contract Price shall not be increased by more than the reasonable, actual, and documented net cost of the extra or emergency work plus ten percent (10%) of such net cost on Work performed by the Contractor and five percent (5%) thereof on any subcontracted Work for overhead and profit combined.

(B) In the case of a decrease in Work, the Contract Price shall not be decreased by less than the net cost of the deleted Work plus five percent (5%) of such direct net cost for profit and overhead.

The term 'net cost' as used herein shall include, as applicable, and shall be limited to, all direct labor, direct material, direct equipment, labor burden, sales taxes, shipping and handling charges, permits and fees, and insurance and bond premium adjustments, if any, attributable to the change. All other items of cost shall be considered as overhead and covered by the percentages allowed in sections A and B of this paragraph.

The Contractor shall provide worksheets or tabulations describing the method by which the direct net cost was calculated, and shall provide all data needed to support the calculation of the direct net cost, all in a form acceptable to the Owner.

15.5 Where the Contract Price is to be adjusted by negotiation, the Owner may authorize and designate the Designer to negotiate with the Contractor on behalf of the Owner; provided, however, any agreement reached between the Contractor and Designer shall be subject to approval by the Owner.



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### ARTICLE 16. UNFORESEEN CONDITIONS

- 16.1 Should the Contractor encounter unforeseen conditions at the Project site materially differing from those shown on the Drawings or indicated in the Specifications or differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Agreement, the Contractor shall immediately, and in no event more than three days later, give notice to the Owner of such conditions before they are disturbed. The Owner and the Designer shall thereupon promptly investigate the conditions and if they find that they materially differ from those shown on the Drawings or indicated in the Specifications, they shall at once make such changes in the Drawings and/or Specifications as they may find necessary. Any increase or decrease in the Contract Price resulting from such changes shall be adjusted in the manner provided herein for adjustments as to extra and/or additional Work and changes. However, neither the Owner nor the Designer shall be liable or responsible for additional work, costs, or changes to the Work that could have been reasonably determined from any reports, surveys, and analyses made available for the Contractor's review or that could have been discovered by the Contractor through the performance of its obligations pursuant to the Contract Documents.

### ARTICLE 17. CORRECTION OF WORK BEFORE FINAL PAYMENT

- 17.1 The Owner has the authority to stop or suspend work, and the Designer has the authority to order Work removed or to order corrections of defective Work or Work not in compliance with the Contract Documents where such action may be necessary to ensure successful completion of the Work.

Any work, materials, fabricated items, or other parts of the Work which have been found by the Designer to be defective or not in accordance with the Contract Documents shall be condemned and shall be removed from the Project by the Contractor, and immediately replaced by new Work in accordance with the Contract Documents at no additional cost to the Owner. Work or property of the Owner or others damaged or destroyed by virtue of such condemned Work shall be made good at the expense of the Contractor.

Correction of condemned Work described above shall be commenced by the Contractor within twenty-four (24) hours after notice from the Designer or the Owner and shall be pursued to completion. Should the Contractor fail to proceed reasonably with the above-mentioned corrections, the Owner may, three (3) days after the notice specified in the preceding sentence, proceed with correction, paying the cost, including costs of uncovering such condemned Work, of such corrections from amounts due or to become due to the Contractor.

Condemned Work removed shall be the property of the Contractor and shall be removed from the Project by him within ten (10) days after notice to remove it, and if not then removed, thereafter may be disposed of by the Owner without compensation to the Contractor and the cost of such disposal shall be deducted from amounts due or to become due to the Contractor.



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Should the cost of correction of the Work and, if applicable, disposal of the condemned Work by the Owner exceed amounts due or to become due the Contractor, then the Contractor and the Contractor's sureties shall be liable for and shall pay to the Owner the amount of such excess.

### **ARTICLE 18. CORRECTION OF WORK AFTER SUBSTANTIAL COMPLETION; WARRANTIES AND GUARANTIES**

18.1 Neither the final certificate, Final Payment, occupation of the premises by the Owner, nor any provision of the Contract Documents, nor any other act or instrument of the Owner or the Designer shall relieve the Contractor from responsibility for negligence, defective material or workmanship, or failure to comply with the Contract Documents.

18.2 The Contractor shall, at the Contractor's sole cost and expense, make all necessary repairs, replacements, and corrections of any nature or description, interior or exterior, structural or non-structural, that shall become necessary by reason of defective workmanship or materials which appear within a period of one (1) year from the date of Substantial Completion; provided, however that notwithstanding the preceding, if any longer guarantee period is specified for any particular materials or workmanship under the Contract Documents, or under any subcontract, or in connection with any manufactured unit which is installed in the Project, or under the laws of the State of North Carolina, the longer guarantee period shall govern.

18.3 If, within any guarantee period, repairs or changes are required in connection with the Work, which are rendered necessary as the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract Documents, the Contractor shall, promptly upon receipt of notice from the Designer and without expense to the Owner:

- a) Completely repair or replace the Work so that it conforms to the Contract Documents;
- b) Correct all defects therein;
- c) Make good all damage which, in the opinion of the Designer, is the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract Documents; and
- d) Make good any Work or material, or any equipment or contents disturbed in fulfilling any such guarantee.

If, in fulfilling the requirements of the Contract Documents or of any guarantee embraced therein or required thereby, the Contractor disturbs any work, facility, premises, or construction belonging to the Owner, the Contractor shall restore such disturbed work to a condition satisfactory to the Owner, and shall guarantee such restored work to the same extent as if it were Work under the Contract Documents.

If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Owner may have the defects corrected, and the Contractor and the



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Contractor's sureties shall be liable for all expenses incurred. "Promptly" is defined as within twenty-four (24) hours for systems necessary to normal operation of the building and within seventy-two (72) hours for all other items. All special guarantees applicable to definite parts of the Work that may be shown in or required by Contract Documents shall be subject to the terms of this paragraph during the first year of the life of such special guarantee. Manufacturer's standard guarantees or warranties which do not comply with the time limit specified herein shall be extended by the Contractor automatically without further action on the part of the Owner or the Designer.

- 18.4 In the eleventh calendar month after the date of Substantial Completion, and at the request of the Owner, the Contractor, the Owner and the Designer shall make an inspection of the Work for the purpose of identifying defective workmanship and/or materials. If the Contractor, having been requested to do so by the Owner, fails to participate in such inspection, the Contractor shall be conclusively bound by any decision or ruling by the Designer as to any defective workmanship or material and as to the Contractor's responsibility for its repair or replacement.

### **ARTICLE 19. OWNER'S RIGHT TO DO WORK**

- 19.1 If, during the progress of the Work or during any period of guarantee, the Contractor fails to prosecute the Work properly or to perform any provision of the Contract Documents, the Owner, after three (3) days written notice to the Contractor from the Designer, or from the Owner after Final Payment, may perform or have performed that portion of the Work and may deduct the cost thereof from any amounts due or to become due the Contractor. Notwithstanding any action by the Owner under this paragraph, all warranties and bonds given or to be given by the Contractor shall remain in effect or shall be given by the Contractor.
- 19.2 Should the cost of such action by the Owner exceed the amount due or to become due the Contractor, the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of such excess.

### **ARTICLE 20. PARTIAL PAYMENTS**

- 20.1 Within thirty (30) days after his initial receipt of the Construction Agreement for signatures, the Contractor shall submit to the Designer a Schedule of Values. The Schedule of Values shall indicate the value of the Work, including applicable overhead and profit, for each Division and section of the Project Specifications. The Designer and Owner shall be provided with the Contractor's estimate papers, Subcontractor agreements, supplier quotes, or other documents substantiating these values if so requested in writing by the Designer. The Contractor shall provide the requested documentation within seven (7) days after receipt of the Designer's written request. The Schedule of Values shall be subject to approval by the Owner, and if the Owner and the Contractor cannot agree upon the Schedule of Values, the Designer shall prepare it, and the Schedule of Values as prepared by the Designer shall be binding on the Owner and the Contractor. No Request for Payment shall be certified by the Designer until the Designer has issued approval of said Schedule of Values.



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20.2 Not later than the fifth (5th) day of each calendar month the Contractor shall submit to the Designer a Request for Payment for Work done during the previous calendar month. The Request for Payment shall be in form of AIA Document G702 (latest edition) and shall show substantially the value of Work done (including the value of material delivered to the Project or stored by the Contractor at another site, subject to the conditions hereinafter set forth) during the previous calendar month, and shall sum up the financial status of the Work with the following information:

- a) Total Contract Price, including any adjustment thereto made pursuant to the Contract Documents.
- b) Value of Work completed and materials properly stored to date.
- c) Less amount retained.
- d) Less previous payments.
- e) Current amount due.
- f) Balance remaining.

The Contractor, upon request of the Designer, shall substantiate the request with invoices, vouchers, payrolls, or other evidence.

20.3 When payment is requested or made on an account of stored materials, such materials must be stored on the Owner's property at such places and in such a manner as may be designated by the Designer. However, in the sole discretion of the Owner, with permission in writing from the Designer and Owner and under such circumstances as may be determined by the Owner, such materials may be stored in a bonded warehouse. The location and conditions for storage of such materials away from the Owner's property in a bonded warehouse shall be within the sole discretion of the Owner. Requests for Payment on account of stored materials shall be accompanied by paid invoices, bills of sale, warehouse receipts, or other documentary evidence establishing Owner's title to such materials, evidence that the stored materials are insured against loss and damage, and such other documentation as required by the Designer. Responsibility for the quantity, quality, and condition of such stored materials, whether stored on the Owner's property or away from the Owner's property, shall remain with the Contractor regardless of ownership or title. No payment shall be made on account of materials stored in a bonded warehouse unless the Contractor has acquired written permission from the Designer for such storage of materials and has complied with all conditions set forth in such permission regarding such storage of materials in a bonded warehouse.

20.4 Any Request for Payment received by the Designer on or before the fifth (5th) of the calendar month shall be certified for payment or returned for re-submission to the Contractor on or before the fifteenth (15th) of the calendar month. The Designer's certification shall be for the amount which was requested or that which the Designer has decided was justly due, and shall state in writing to the Contractor and Owner the reasons for withholding payment of any or all of the amount requested.



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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- 20.5 The Designer may fail to certify all or part of any payment requested for any of the following reasons:
- a) Defective Work not corrected.
  - b) Suits, actions, or claims of any character filed against the Contractor, or due to the operations of the Contractor, or information or notice that a suit, action, or claim will be filed or has been made.
  - c) Information or notice that a Subcontractor or a supplier has not received payment.
  - d) The balance unpaid of the Contract Price is insufficient to complete the Work in the judgment of the Designer or Owner.
  - e) Damage to the Owner or another contractor.
  - f) Inability of the Contractor to meet a Completion Date, including an anticipated failure to meet a Completion Date entitling the Owner to withhold anticipated Liquidated Damages in accordance with paragraphs 13.16 and 13.18 hereof.
  - g) Failure to furnish Submittal as required by the Contract Documents on a timely basis in accordance with the Submittal Register.
  - h) Such other reason as to the Designer may appear prudent, proper, or equitable.

When grounds for withholding certification have been corrected, the Designer shall so certify to the Owner and the Owner shall make any payment due with respect to such certification as a part of his next payment after such certification.

- 20.6 No certificate issued or progress payment made shall constitute an acceptance of the Work or any part thereof.
- 20.7 The amount certified by the Designer for payment shall be ninety-five percent (95%) of the value of Work completed and materials stored since the Designer's last certification as shown on the Request for Payment, less any amounts not certified in accordance with paragraph 20.4, and this amount shall be paid by the Owner on or before the last business day of the month, but payment shall not be past due until not paid within fifteen (15) days thereafter.
- 20.8 After certification by the Designer that the Work is fifty percent (50%) complete, based on a determination that the Contractor's gross project invoices, excluding the value of materials stored off-site, equal or exceed fifty percent (50%) of the value of the Contract, (except the value of materials stored on-site shall not exceed twenty percent (20%) of the Contractor's gross project invoices for the purpose of determining whether the Project is fifty percent (50%) complete) and the Contractor has provided to the Owner the written consent of its sureties to the cessation of further percentage retention, the amount certified for payment with respect to subsequent Requests for Payment shall be one hundred percent (100%) of the value of Work completed and materials stored since the Designer's last certification as shown on the Request for Payment, less any amounts not certified in accordance with



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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paragraphs 20.4 and 20.5; provided, however, that the aggregate of periodic payments shall not exceed ninety-seven and one half percent (97.5%) of the Contract Price. If the Owner determines that the Contractor's performance under the Contract is unsatisfactory, the Owner may resume withholding percentage retention from each subsequent periodic payment application up to the maximum amount of five percent (5%) of the Contract Price.

### ARTICLE 21. FINAL PAYMENT

- 21.1 If the Work of the Contractor is limited to demolition, pilings, caissons and/or structural steel, the remaining unpaid balance of the Contractor's Contract Price, less a sum equal to five-tenths percent (0.5%) of the Contract Price, shall be paid within sixty days following receipt of the following documents, all of which must be received before payment shall become due: (i) request for payment from the Contractor; (ii) receipt of consent from the Contractor's surety to the payment; and (iii) approval or certification from the Designer that the work performed by the Contractor is acceptable and in accordance with the Contract Documents.
- 21.2 Except as set forth in paragraph 21.1, within forty five days after Substantial Completion of the Project, the remaining unpaid balance of the Contract Price shall be paid to the Contractor, less an amount equal to two and one-half times the value of punch list work or other work remaining to be completed or corrected, as reasonably estimated by the Owner.
- 21.3 Upon Substantial Completion, the Designer shall prepare and submit to the Contractor a deficiency list identifying all portions of the Work which are known by the Designer at that time to be incomplete or defective. Within thirty (30) days of receipt of this deficiency list, the Contractor shall complete and correct all items on that list along with all other Work required to achieve Final Completion of the Work. At any time prior to completion of the period of warranty, the Designer may submit to the Contractor a supplemental deficiency list, in which case the Contractor shall complete or correct any and all new items identified on the Supplemental deficiency list within the time period stipulated in paragraph 18.3.
- 21.4 Final Payment of any remaining balance of the Contract Price shall not be due to the Contractor until the Contractor achieves Final Completion of the Project.
- 21.5 The making and acceptance of Final Payment shall constitute a waiver of all claims by the Owner except:
- a) Claims arising from unsettled liens or claims against the Contractor.
  - b) Defective Work or materials appearing after Final Payment.
  - c) Failure of the Contractor to perform the Work in accordance with the Contract Documents.
  - d) As conditioned in the Performance Bond.
  - e) Claims made prior to Final Payment which remain unsettled.
  - f) Amounts due arising under Articles 18 and 28.





## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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- g) Claims for recovery of overpayment based upon incorrect measurement, estimate, or certificate.
- 21.6 The making and acceptance of Final Payment shall constitute a waiver of all claims by the Contractor except those claims previously made in writing pursuant to paragraph 15.2 and not finally resolved.
- 21.7 The Designer shall not authorize Final Payment until all of the Work under the Contract Documents has been certified by the Designer as completed, proper and suitable for occupancy and use, and has been approved by all federal, state and local agencies having jurisdiction.
- 21.8 The final Request for Payment shall be identified on its face as such and shall be presented by the Contractor to the Designer within thirty (30) days of completion of the Work. Final payment of the retained amount due the Contractor shall be made by the Owner within thirty (30) days after the later of (i) full and Final Completion of all Work required by the Contract Documents, and certification of such Work in accordance with paragraph 20.4; (ii) submission of the affidavits of other documentation required by Article 22; (iii) submission by the Contractor of a Request for Payment identified on its face as final and including the Designer's certification.

### **ARTICLE 22. CONTRACTOR, SUBCONTRACTOR AND SUPPLIER AFFIDAVIT**

- 22.1 The Final Payment due the Contractor on account of the Contract Documents shall not become due until the Contractor has furnished to the Owner through the Designer: (A) an affidavit by the Contractor signed, sworn, and notarized to the effect that all payments for materials, services, or for any other reason in connection with the Work or performance of the Contract Documents have been satisfied and that no claims or liens exist against the Contractor in connection with the same; (B) affidavits from each Subcontractor and supplier signed, sworn, and notarized to the effect that (i) each such Subcontractor or supplier has been paid in full by the Contractor for all Work performed and/or materials supplied by him in connection with the Project, and (ii) that all payments for materials, services, and for any other reason in connection with the subcontract or supply contract have been satisfied and that no claims or liens exist against the Subcontractor or supplier in connection therewith; and (C) the written consent of the Contractor's sureties to Final Payment. In the event that the Contractor cannot obtain an affidavit, as required above, from any Subcontractor or supplier, the Contractor shall state in the Contractor's affidavit that no claims or liens exist against such Subcontractor or supplier to the best of the Contractor's knowledge, and that if any appear afterwards, the Contractor shall save the Owner harmless for all costs and expenses, including attorneys fees, on account thereof.

### **ARTICLE 23. ASSIGNMENTS AND SUBCONTRACTS**

- 23.1 The Contractor shall not assign any portion of this Agreement nor subcontract the Work in its entirety without the prior written consent of the Owner. Except as may be required under terms of the bonds required by the Contract Documents, no funds or sums of money due or to become due to the Contractor under the Contract Documents may be assigned.



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### ARTICLE 24. MEASUREMENTS

- 24.1 Before ordering material or doing Work which is dependent for proper size or installation upon coordination with building conditions, the Contractor shall verify all dimensions and shall be responsible for the correctness of same. No consideration will be given for any claim based on differences between the actual dimensions and those indicated in the Contract Documents. Any discrepancies between the Contract Documents and the existing conditions shall be referred to the Designer for adjustment before any Work affected thereby is begun.

### ARTICLE 25. CONTRACTOR AND SUBCONTRACTOR RELATIONSHIPS

- 25.1 Within thirty (30) days after initial receipt of the Construction Agreement for signatures the Contractor shall submit to the Designer and Owner for acceptance a current list of the names of Subcontractors and such other persons and organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for any and all portions of the Work. The Contractor shall provide this list at this time even if the Contractor was required to submit a list of proposed Subcontractors with the Contractor's bid. The Designer shall promptly reply to the Contractor in writing stating whether or not the Owner or the Designer, after due investigation, has objection to any such proposed person or entity or if it needs additional information to evaluate the persons on the list. Failure of the Designer to reply within ten (10) days after the Contractor has furnished all required information shall constitute notice of no objection.

The Contractor shall not contract with any such proposed person or entity to whom the Owner or the Designer has made reasonable objection. If the Designer or Owner has reasonable objection to any such proposed person or entity, the Contractor shall submit a substitute to whom the Owner and the Designer have no reasonable objection. The Contractor shall make no substitution for any Subcontractor, person, or entity previously allowed without first notifying the Designer and Owner in writing and no substitution may be made if the Owner or Designer makes a reasonable objection to such substitution.

- 25.2 The Contractor agrees that the terms of the Contract Documents, including all portions thereof, shall apply to all Subcontractors of the Contractor as if they were the Contractor, and that the Subcontractors of the Contractor shall, by means of their subcontracts, be bound by all the terms of the Contract Documents including, but not limited to, Article 26 of these General Conditions.
- 25.3 Payments to Subcontractors shall be made in accordance with the provisions of N.C. Gen. Stat. §143-134.1.

### ARTICLE 26. USE OF PREMISES

- 26.1 The Contractor shall confine apparatus, the storage of materials, the operations of workers, and the disposal of material to limits indicated by law, ordinances, permits, and directions of the Designer, if any.
- 26.2 The Contractor shall not load or permit any part of the Work to be loaded with a weight that will endanger its safety, intended performance, or configuration.



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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- 26.3 The Contractor shall enforce all of the Designer's instructions, including, but not limited to, those regarding signs, advertisements, fires, and smoking.

### **ARTICLE 27. CUTTING, PATCHING AND FITTING**

- 27.1 The Contractor shall do all cutting, fitting, and patching of the Work that may be required to make its several parts come together properly and fit it to receive or to be received by Work shown in or which can be reasonably implied from the Contract Documents.

### **ARTICLE 28. DISPUTE RESOLUTION**

- 28.1 The laws of the State of North Carolina shall apply to the interpretation and enforcement of this Agreement. Any and all suits or actions to enforce, interpret, or seek damages with respect to any provision of, or the performance or nonperformance of, this Agreement shall be brought in the General Court of Justice of North Carolina sitting in Wake County, North Carolina, and it is agreed by the parties that no other court shall have jurisdiction or venue with respect to such suits or actions. Appendix A shall be a part of the Contract Documents. Prior to initiating an action under this Article, any party to this Agreement shall initiate the mediation process as provided in Appendix A to these General Conditions of the Contract for Construction.

- 28.2 Any person or firm that expressly or impliedly agrees to perform labor or services or to provide material, supplies, equipment, work, performance or payment bonds, insurance or indemnification for the construction of the Project or the Work shall be deemed a party to this Agreement solely for the purpose of this Article 28. The Contractor, by means of its subcontracts, shall specifically require its Subcontractors to be bound by this Article.

### **ARTICLE 29. TAXES**

- 29.1 The Contractor has included in the Contract Price and shall pay all taxes assessed by any authority on the Work or the labor and materials used therein. The Contractor shall maintain all tax records during the life of the Project and furnish the Owner with a complete listing of all taxes paid by taxing authority, invoice number, date, amount, etc. in a form acceptable to the Owner. The Contractor is required to maintain a file showing taxes paid on the Project for three (3) years after Final Payment or turn said documents over to the Owner for his files.

- 29.2 The following is a list of requirements to be followed by the Contractor in maintaining proper records and reporting the North Carolina Sales and Use Tax and Local Sales and Use Tax. The Contractor shall comply fully with the requirements outlined below, in order that the Owner may recover the amount of the tax permitted under the law.
- a) It shall be the Contractor's responsibility to furnish the Owner documentary evidence showing the materials used and sales and use tax paid by the Contractor and each of his Subcontractors. Such evidence shall be transmitted to the Owner with each pay request irregardless of whether taxes were paid in that period.



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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- b) The documentary evidence shall consist of a certified statement by the Contractor and each of the Contractor's Subcontractors individually, showing total purchases of materials from each separate vendor and total sales and use taxes paid to each vendor. Certified statements must show the invoice number, or numbers, covered, and inclusive dates of such invoices.
- c) Materials used from Contractor's or Subcontractor's warehouse stock shall be shown in a certified statement at warehouse stock prices.
- d) The Contractor shall not be required to certify the Subcontractor's statements.

### **ARTICLE 30. OPERATION OF OWNER'S FACILITIES**

- 30.1 The Contractor agrees that all Work done under the Contract Documents shall be carried on in such a manner so as to ensure the regular and continuous operation of the adjoining or adjacent facilities. The Contractor further agrees that the sequence of operations under the Contract Documents shall be scheduled and carried out so as to ensure said regular and continuous operation. The Contractor shall not close any areas of construction until so authorized by the Designer. The Contractor shall control operations to assure the least inconvenience to the public. Under all circumstances, safety shall be the most important consideration.

### **ARTICLE 31. THIRD PARTY BENEFICIARY CLAUSE**

- 31.1 It is specifically agreed between the parties executing the Agreement that, with the specific exception set forth paragraph 7.24 hereof, and that exception only, the Contract Documents and the provisions therein are not intended to make the public, or any member thereof, a third-party beneficiary of the Agreement, or to authorize anyone not a party to the Contract Documents to maintain a suit for personal injuries or property damage pursuant to the terms of provisions of the Contract Documents.

### **ARTICLE 32. MEASUREMENT OF QUANTITIES**

- 32.1 All Work completed under the Contract Documents shall be measured by the Contractor using United States customary units of measurement. The method of measurement and computations to be used in determination of quantities of material furnished and of Work performed under the Contract Documents shall be those methods set forth in the Contract Documents or, if not specifically set forth therein, the method generally recognized as conforming to good engineering practice.

### **ARTICLE 33. TERMINATION BY THE OWNER FOR CAUSE**

- 33.1 If the Contractor fails to begin or complete the Work under the Contract Documents within the time specified, or fails to perform the Work with sufficient labor and equipment or with sufficient materials to insure the prompt completion of said Work, or shall perform the Work unsuitably or shall discontinue the prosecution of the Work for three (3) days, or if the Contractor shall become insolvent, be declared bankrupt, commit any act of bankruptcy or insolvency, allow any final judgment to stand against the Contractor or its affiliated



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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companies unsatisfied for a period of forty-eight (48) hours, 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 to the Contractor and the Contractor's sureties of such delay, neglect, or default, specifying the same, and if the Contractor within a period of three (3) days after such notice shall not proceed in good faith and with reasonable speed to correct such delay, neglect, or default in accordance with such notice, the Owner shall have full power and authority, to the extent permitted by law, without violating the Contract Documents, to take the prosecution of the Work out of the hands of the Contractor, to appropriate or use any or all materials and equipment at the Project as may be suitable and acceptable, and may enter into an agreement for the completion of the Work or pursue such other methods as in the Owner's opinion shall be necessary or appropriate for the completion of the Work in an acceptable manner. All costs and charges incurred by the Owner in proceeding in accordance with the preceding sentence, including attorney's fees, and all costs incurred by the Owner in completing the Work shall be deducted from any money due or which becomes due the Contractor. If such costs and expenses incurred by the Owner shall be less than the sum which would have been payable under Contract Documents if it had been completed by the Contractor, then the Contractor shall be entitled to receive the difference, but if such costs and expenses shall exceed the sum which would have been payable under the Contract Documents, the Contractor and the Contractor's surety shall be liable to the Owner for and shall pay to the Owner the amount of such excess.

### **ARTICLE 34. TERMINATION OR SUSPENSION BY THE OWNER FOR CONVENIENCE**

- 34.1 The Owner may, without cause, order the Contractor to terminate, suspend, delay, or interrupt the Work in whole or in part for such period of time as the Owner may determine.
- 34.2 If the Contractor is subsequently ordered by the Owner to resume the Work, any cost or expenses to which the Contractor may be entitled by reason of the suspension, delay, or interruption shall be recovered by means of a Change Order in accordance with Articles 13 and 14 hereof and the Contract Construction Schedule shall be adjusted in accordance with Article 13 hereof.
- 34.3 The Owner shall terminate the Work or portion thereof by written notice when the Contractor is prevented from proceeding with the Work as a direct result of an executive order of the President with respect to the prosecution of war or in the interest of national defense.
- 34.4 In the event of termination by the Owner under this Article, the Contractor shall be entitled to receive the reasonable and documented direct costs incurred prior to termination, including the cost of materials purchased for the Work which purchases cannot be canceled or which material cannot reasonably be used by the Contractor on other work, and the cost of closing down the Project in a safe and efficient manner, plus ten percent (10%) thereof for overhead and profit, subject to the following conditions:
- a) When the Contract is terminated before completion of all items of Work, payment shall be made for the actual number of units or items of Work completed at the applicable contract prices, or as mutually agreed for items of Work partially complete. If a mutual agreement cannot be reached, the Owner shall have the



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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authority to make such equitable adjustment as it deems warranted and the Final Payment shall be made accordingly.

- b) Reimbursement for organization of any Work and moving equipment to and from the job shall be considered when not otherwise provided for in the Contract Documents where the volume of completed Work is too small to compensate the Contractor for those expenses under unit prices. If a mutual agreement cannot be reached, the Owner will have the authority to make such equitable adjustments as it deems warranted and the Final Payment will be made accordingly.
- c) Materials obtained by the Contractor for the Work that have been inspected and accepted by the Designer and that are not incorporated in the Work shall, at the request of the Contractor, be purchased from the Contractor at the Contractor's actual cost as shown by receipted bills and actual costs records at such points of delivery as may be determined by the Owner.
- d) No payment shall be made by Owner to Contractor except as herein above provided. No claim for loss of anticipated profits shall be considered or allowed.
- e) Termination of the Contract shall not relieve the Contractor of his responsibilities for any completed portion of the Work nor shall it relieve his sureties of their obligation for and concerning any just claims arising out of the Work performed.

The Contractor shall not be entitled to any other compensation, including compensation for lost profit, lost opportunity, or any other direct or consequential cost, loss, or damage.

### **ARTICLE 35. MINORITY BUSINESS ENTERPRISE PROGRAM**

- 35.1 The Contractor shall at all times comply with the latest edition of the Wake County Minority Business Enterprise Policy. All documentation substantiating compliance with the requirements of this program shall be delivered to the Owner as stipulated in the Contract Documents. A copy of the Wake County Minority Business Enterprise Policy is included in the Project Manual.

### **ARTICLE 36. GENERAL**

- 36.1 If any provision of the Agreement shall be declared invalid or unenforceable, the remainder of the Agreement shall continue in full force and effect.
- 36.2 The titles to Articles herein are for convenience only, are not substantive parts of the General Conditions, and are not to be considered in interpreting the Contract Documents.

END OF GENERAL CONDITIONS OF THE  
CONTRACT FOR CONSTRUCTION

**TYPICAL SUPPLEMENTARY GENERAL CONDITIONS**

**GENERAL**

These Supplementary Conditions contain changes and additions to the project "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION", as published herein. Where any Article of the General Conditions is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of the Article, Paragraph, Subparagraph or Clause shall remain in effect.

**ARTICLE 1 - DEFINITIONS**

Paragraph 1.13: At the end of the existing paragraph, add the following:

The Contract Time is (300) Three Hundred consecutive calendar days, beginning on the Date of Commencement as specified in the written Notice-to-Proceed.

Paragraph 1.18: Delete the last sentence in its entirety and substitute the following in lieu thereof:

“A list of the Drawings is contained in the “Supplementary General Conditions.”

C001	COVER
C002	ABBREVIATIONS, SYMBOLS, AND GENERAL NOTES
G100	CODE SUMMARY 12 <sup>TH</sup> FLOOR
G101	CODE SUMMARY 14 <sup>TH</sup> FLOOR
G102	GENERAL BUILDING CODE DOCUMENTATION
G103	FIRE SAFETY EVALUATION REPORT OF EXISTING CONDITIONS
G104	EXISTING FIRE-RESISTANT ASSEMBLIES
G105	REFERENCE DOCUMENTS FOR PROPOSED WORK
G106	REFERENCE DOCUMENTS FOR PROPOSED WORK
G107	REFERENCE DOCUMENTS FOR PROPOSED WORK
G108	REFERENCE DOCUMENTS FOR PROPOSED WORK
G109	REFERENCE DOCUMENTS FOR PROPOSED WORK
G110	LIFE SAFETY PLANS
D101	DEMOLITION PLAN 12 <sup>TH</sup> FLOOR
D102	DEMOLITION PLAN 14 <sup>TH</sup> FLOOR
A101	10 <sup>TH</sup> & 12 <sup>TH</sup> FLOOR - NEW WORK
A102	14 <sup>TH</sup> FLOOR - NEW WORK
A103	12 <sup>TH</sup> FLOOR - DIMENSION PLAN
A104	14 <sup>TH</sup> FLOOR - DIMENSION PLAN
A111	12 <sup>TH</sup> FLOOR - REFLECTED CEILING PLAN
A112	14 <sup>TH</sup> FLOOR - REFLECTED CEILING PLAN
A131	12 <sup>TH</sup> FLOOR - FINISH PLAN
A132	14 <sup>TH</sup> FLOOR - FINISH PLAN
A133	12 <sup>TH</sup> FLOOR - SIGNAGE PLAN
A134	14 <sup>TH</sup> FLOOR - SIGNAGE PLAN
A135	SIGNAGE DETAILS
A136	SIGNAGE DETAILS
A137	12 <sup>TH</sup> FLOOR - FURNITURE PLAN (FOR REFERENCE ONLY)
A138	14 <sup>TH</sup> FLOOR - FURNITURE PLAN (FOR REFERENCE ONLY)
A401	ENLARGED TOILET PLANS AND ELEVATIONS
A402	ENLARGED TOILET PLANS AND ELEVATIONS
A403	ENLARGED PLANS AND ELEVATIONS
A404	ENLARGED PLANS AND ELEVATIONS

A501	PLAN DETAILS
A502	PLAN AND SECTION DETAILS
A503	PLAN AND SECTION DETAILS
A504	PLAN AND SECTION DETAILS
A505	CEILING DETAILS
A506	CEILING DETAILS
A510	MILLWORK DETAILS
A601	DOOR SCHEDULE, HEAD & JAMB DETAILS, WINDOW ELEVATIONS
FP001	FIRE PROTECTION LEGEND AND SCHEDULES
FP002	FIRE PROTECTION FIRE PUMP TEST
FP003	FIRE PROTECTION DETAILS
FP100	FIRE PROTECTION 12TH FLOOR PLAN - DIMENSIONS
FP101	FIRE PROTECTION 12TH FLOOR PLAN - PIPING
FP200	FIRE PROTECTION 14TH FLOOR PLAN - DIMENSIONS
FP201	FIRE PROTECTION 14TH FLOOR PLAN - PIPING
P001	PLUMBING LEGEND AND SCHEDULES
P002	PLUMBING RISERS
P100	PLUMBING 12TH FLOOR PLANS - DEMOLITION
P101	PLUMBING 14TH FLOOR PLANS - DEMOLITION
P200	PLUMBING 12TH FLOOR PLANS - NEW WORK
P201	PLUMBING 14TH FLOOR PLANS - NEW WORK
M001	MECHANICAL LEGEND, SCHEDULES & DETAILS
M002	MECHANICAL WATER DEMAND SCHEMATIC & DETAILS
M100	MECHANICAL 12TH FLOOR PLAN - DUCTWORK
M101	MECHANICAL 12TH FLOOR PLAN - PIPING
M200	MECHANICAL 14TH FLOOR PLAN - DUCTWORK
M201	MECHANICAL 14TH FLOOR PLAN - PIPING
M300	MECHANICAL 15TH FLOOR PLAN - NEW WORK
M400	MECHANICAL CONTROLS
E001	ELECTRICAL LEGEND AND DETAILS
E002	ELECTRICAL DETAILS
E003	ELECTRICAL SCHEDULES
E100	ELECTRICAL 12TH FLOOR PLAN - DEMOLITION
E101	ELECTRICAL 14TH FLOOR PLAN - DEMOLITION
E200	ELECTRICAL 12TH FLOOR PLAN - LIGHTING
E201	ELECTRICAL 14TH FLOOR PLAN - LIGHTING
E300	ELECTRICAL 12TH FLOOR PLAN - POWER
E301	ELECTRICAL 14TH FLOOR PLAN - POWER
E400	ELECTRICAL 10TH & 11TH FLOOR PLAN - SECURITY INFRASTRUCTURE
E401	ELECTRICAL 12TH FLOOR PLAN - SECURITY INFRASTRUCTURE
E402	ELECTRICAL 14TH FLOOR PLAN - SECURITY INFRASTRUCTURE
E403	ELECTRICAL SECURITY DETAILS
FA001	FIRE ALARM LEGEND, DETAILS & RISER
FA002	FIRE ALARM DETAILS
FA100	FIRE ALARM 12TH FLOOR PLAN - DEMOLITION
FA101	FIRE ALARM 14TH FLOOR PLAN - DEMOLITION
FA200	FIRE ALARM 12TH FLOOR PLAN - NEW WORK
FA201	FIRE ALARM 14TH FLOOR PLAN - NEW WORK

**ARTICLE 3. FAMILIARITY WITH WORK, CONDITIONS AND LAWS**

Paragraph 3.3: At the end of the existing paragraph, add the following paragraph:



“To ensure compliance with the E-Verify requirements of the General Statutes of North Carolina, all contractors, including any subcontractors employed by the contractor(s), by submitting a bid, proposal or any other response, or by providing any material, equipment, supplies, services, etc., attest and affirm that they are aware and in full compliance with Article 2 of Chapter 64, (NCGS64-26(a)) relating to the E-Verify requirements.”

“By signing this agreement; accepting this contract/purchase order; or submitting any bid, proposal, etc., vendors and contractors certify that as of the date of execution, receipt, or submission they are not listed on the Final Divestment List created by the NC Office of State Treasurer pursuant to NCGS 147 Article 6E, Iran Divestment Act, Iran Divestment Act Certification. Vendors and contractors shall not utilize any subcontractor that is identified on the Final Divestment List.”

“Any organization defined under NCGS 147-86.80(2), Divestment from Companies Boycotting Israel, shall not engage in business totaling more than \$1,000 with any company/business, etc. that boycotts Israel. A list of companies that boycott Israel is maintained by the NC Office of State Treasurer, pursuant to NCGS 147-86.81(a)(1). Any company listed as boycotting Israel is not eligible to do business with any State agency or political subdivision of the State.”

“If the source of funds for this contract is federal funds, the following federal provisions apply pursuant to 2 C.F.R. § 200.326 and 2 C.F.R. Part 200, Appendix II (as applicable): Equal Employment Opportunity (41 C.F.R. Part 60); Davis-Bacon Act (40 U.S.C. 3141-3148); Copeland “Anti-Kickback” Act (40 U.S.C. 3145); Contract Work Hours and Safety Standards Act (40 U.S.C. 3701- 3708); Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387); Debarment and Suspension (Executive Orders 12549 and 12689); Byrd Anti-Lobbying Amendment (31 U.S.C. 1352); Procurement of Recovered Materials (2 C.F.R. § 200.322); and Record Retention Requirements (2 CFR § 200.324).”

“In consideration of signing this Agreement, the Parties hereby agree not to discriminate in any manner on the basis of race, natural hair or hairstyles, ethnicity, creed, color, sex, pregnancy, marital or familial status, sexual orientation, gender identity or expression, national origin or ancestry, marital or familial status, pregnancy, National Guard or veteran status, religious belief or non-belief, age, or disability with reference to the subject matter of this Contract. The Parties agree to comply with the provisions and intent of Wake County Ordinance SL 2017-4. This anti-discrimination provision shall be binding on the successors and assigns of the Parties with reference to the subject matter of this Contract.”

Add the following paragraph:

- “3.5 A non-mandatory Pre-Bid Conference will be held in the Wake County Office Building 337 S. Salisbury St, Raleigh, NC 27601, in G183 Refinery – Large Meeting Room at 9:30a.m., local prevailing time, on February 20, 2025. Purpose of conference is for prospective Bidders to familiarize themselves with the site and to ask questions pertaining to the Contract Documents. Bidders are reminded that no oral interpretations of meaning of Drawings and Specifications can be made. Conflicts in documents, if any, will be resolved by written addendum. (Reference “Instructions to Bidders, Paragraph 5.

**ARTICLE 5. INSURANCE AND INDEMNITY**

Paragraph 5.1.2: In addition to all other endorsements required by the General Conditions, if the Contractor is required to transport, dispose of or otherwise handle hazardous or toxic waste, material, chemicals, compounds or substances, the policy of insurance shall be further endorsed to

include the following:

Insurance Service Office (ISO) Form #CA 00 01 06 92 or its equivalent, amending exclusion 11 in the following manner:

- i. Delete section a. (1) a.: (Pollution) "being transported or towed by, or handled for movement into, onto or from, the covered auto."
- ii. Delete section a. (1) b.: "Otherwise in the course of transit by the insured."

The Contractor and transporter must comply with all applicable DOT and EPA requirements.

Paragraph 5.1.4: Add the following Paragraph:

"Pollution Legal Liability (PLL)

A PLL policy must be provided for the Project. Coverage must be sudden and non-sudden, and include:

- a) Bodily injury, sickness, disease, mental anguish, or shock sustained by any person, including death;
- b) property damage including physical injury to or destruction of tangible property including the resulting loss of use thereof, cleanup costs, and the loss of use of tangible property that has not been physically injured or destroyed; and
- c) Defense including costs, charges, and expenses incurred in the investigation, adjustment, or defense of claims for such compensatory damages.

The Owner must be named as Additional Insured, and a Non-Owned Disposal Site Endorsement must be provided, scheduling the appropriate landfill.

Minimum PLL limits of coverage shall be:

Per Loss	\$1,000,000
All Losses	\$2,000,000

**ARTICLE 6. OTHER RECORD DOCUMENTS AND SUBMITTALS**

Paragraph 6.1: At the end of the existing paragraph, add the following:

"One (1) copy of the Contract Documents will be furnished to the General Contractor."

**ARTICLE 7. CONTRACTOR**

Paragraph 7.2: Use this paragraph in lieu of the existing paragraph:

"The Contractor shall keep on the Project at all times during its progress a competent Project Manager and a competent Resident Superintendent and necessary assistants who shall not be replaced without prior written approval by the Architect except under extraordinary circumstances, in which event immediate written notice shall be given to the Architect and the Owner. The Project Manager and Resident Superintendent shall each have a minimum of ten (10) years experience on projects of similar scope and complexity with job

responsibilities equivalent to those required on this Project. At any time, the Owner, in its sole discretion, may require the Contractor to replace the Project Manager and Resident Superintendent or both with an experienced and competent person or persons upon seven (7) days written notice from the Owner to the Contractor. Such replacement shall be at the Contractor's expense and at no cost to the Owner. The Project Manager shall be the Contractor's representative at the Project and shall have full authority to act on behalf of the Contractor and to receive any and all notices or instructions given pursuant to the Contract Documents."

Paragraph 7.13: Amend with the addition of the following paragraph:

"The General Contractor shall secure and pay for all building permits, including plumbing, electrical, HVAC and for the permit from the office of the Fire Marshall. The Cost for the Express Permit Review, if necessary, will be paid by others and is not the responsibility of the Contractor."

**ARTICLE 10. DESIGNER**

Add the following paragraphs:

- "10.5 As a part of its Basic Services under the Owner-Designer Agreement, the Designer will conduct a single site visit to determine Substantial Completion of the Work. If, after the performance of said site visit, the Designer determines that the Work is not substantially complete, successive site visits to determine Substantial Completion will be deemed Additional Services under the Owner-Designer Agreement. The Contractor shall be liable to the Owner for any Designer's fees incurred as a result of any such Additional Services of the Designer. Any funds due under this paragraph may be deducted by the Owner from the amounts due the Contractor for such additional Designer's fees and paid directly to the Designer. Should the cost for such Additional Services of the Designer exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess.
- "10.6 As a part of its Basic Services under the Owner-Designer Agreement, the Designer will conduct a single site visit to determine Final Completion of the Work. If, after the performance of said site visit, the Designer determines that the Work is not complete, successive site visits to determine Final Completion of the Work will be deemed Additional Services under the Owner-Designer Agreement. The Contractor shall be liable to the Owner for any Designer's fees incurred as a result of any such Additional Services of the Designer. Any funds due under this paragraph may be deducted by the Owner from the amounts due the Contractor for such additional Designer's fees and paid directly to the Designer. Should the cost for such Additional Services of the Designer exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess."

**ARTICLE 13 - CONTRACT TIME**

Paragraph 13.18: Add the following:

"If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as Step One Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following expiration of the Contract Time and continuing until the actual date of Substantial Completion. Such liquidated damages

are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Substantial Completion of the Work:

**Five Hundred Dollars (\$500.00) per consecutive calendar day**

If the Contractor fails to achieve Final Completion of the Work within thirty (30) consecutive calendar days of the actual date of Substantial Completion of the Work, the Owner shall be entitled to retain or recover from the Contractor, as Step Two Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following the actual date of Substantial Completion and continuing until the actual date of Final Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Final Completion of the Work:

**Two Hundred Fifty Dollars (\$250.00) per consecutive calendar day**

The Owner may deduct liquidated damages described above from any unpaid amounts then or thereafter due the Contractor under this Agreement. Should the amount of any liquidated damages exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess.”

**If the Contractor accidentally activates the Fire Alarm and the building must be evacuated there will be a \$5,000.00 penalty assessed to the Contractor per incident.**

**ARTICLE 29 – TAXES**

Paragraph 29.1: Add the following to the existing paragraph:

“The Contractor is to use the Sales Tax Reporting Form attached to the contract documents for reporting taxes paid.

Add the following paragraph under Article 29

29.3 This project is considered a “Capital Improvement” with respect to Real Property Contracts, and the collection of State sales and use tax, as referenced in North Carolina General Statutes and further clarified in sales and use tax bulletins issued by the North Carolina Department of Revenue. It shall be the responsibility of the Contractor to issue any affidavits of capital improvement to their subcontractors as necessary.

**ARTICLE 36. GENERAL**

Add the following paragraphs:

“36.3 Any specific requirement in this Contract that the responsibilities or obligations of the Contractor also apply to a Subcontractor is added for emphasis and is also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of the Contractor’s responsibilities or obligations shall not be construed to diminish, abrogate, or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.”

**END OF SUPPLEMENTARY GENERAL CONDITIONS**

**APPENDIX A  
TO GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION**

**DISPUTE RESOLUTION PROCEDURES FOR WAKE COUNTY BUILDING CONSTRUCTION  
RENOVATION AND REPAIR PROJECTS**

Table of Rules

**Rule**

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  - B. Initiating the Dispute Resolution Process
  
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## **RULE 1 INITIATING MEDIATED SETTLEMENT CONFERENCES**

**A Purpose of Mandatory Settlement Conferences.** Pursuant to G.S. §143-128(f1) and 143-135.26(11), these Rules are promulgated to implement a mediated settlement program designed to focus the parties' attention on settlement rather than on claim preparation and to provide an opportunity for orderly settlement negotiations to take place. Nothing herein is intended to limit or prevent the parties from engaging in settlement procedures voluntarily at any time prior to or during commencement of the dispute resolution process.

### **B Initiating the Dispute Resolution Process**

Any party to a County public construction contract (referred to herein generally as the "Contract") governed by Article 8. Ch. 143 of the General Statutes and identified in G.S. § 143-128(f1) and who is a party to a dispute arising out of the Contract and the construction process in which the amount in controversy is at least \$15,000 may submit a written request to the County for mediation of the dispute.

Prior to submission of a written request for mediation to the County, the parties should give notice of any and all claims in accordance with their respective contracts, obtain decisions on the claims as required or allowed by their respective contracts, and attempt to resolve the dispute according to the terms and conditions in their respective contracts. The Mediator may adjourn any mediated settlement conference if the Mediator believes, in his or her sole discretion, that the parties have not satisfied all of the terms and conditions of their respective contracts and that doing so will enhance the prospects for a negotiated settlement.

**C Condition Precedent to Litigation.** Before any party to a Contract may commence a civil action against the County seeking remedies for breach or non-performance of the Contract by the County, said party must first initiate the dispute resolution process under these rules and attend the mediated settlement conference.

## **RULE 2 SELECTION OF MEDIATOR**

**A Mediator Listing.** A list of Mediators acceptable to the County is attached to and incorporated by reference into these Rules. The party requesting mediation shall select a Mediator from the designated list. If the County fails to provide a list of acceptable mediators, the list of Mediators shall be deemed to be the list of mediators certified by the North Carolina Dispute Resolution Commission to conduct mediated settlement conferences in the North Carolina Superior Courts.

**B Selection of a Mediator.** The party requesting mediation shall select a Mediator from the County's list of Mediators and shall file, with the County, a

Notice of Selection of Mediator within 21 days of the request for mediation. Such notice shall state the name, address, and phone number of the Mediator selected. If the Mediator selected is not available or declines to participate for any reason, the requesting party shall select another person from the County's list of Mediators. If the party requesting mediation does not select and designate a mediator within 21 days of the request for mediation, the County shall have the right in its absolute discretion to appoint a mediator from its list of Mediators.

- C Disqualification of Mediator.** Any party may request replacement of the Mediator for good cause. Nothing in this provision shall preclude Mediators from disqualifying themselves.

### **RULE 3 THE MEDIATED SETTLEMENT CONFERENCE**

- A Where Conference is to be Held.** Unless all parties and the Mediator otherwise agree, the mediated settlement conference shall be held in Wake County. The Mediator shall be responsible for reserving a place, making arrangements for the conference, and giving timely notice of the time and location of the conference to all attorneys, unrepresented parties and other persons or entities required to attend.

- B When Conference is to be Held.** The mediation shall be completed within 90 days after selection of the Mediator.

- C Request to Accelerate or Extend Deadline for Completion.** Any party or the Mediator may request the County to accelerate or extend the deadline for completion of the conference. Such request shall state the reasons the extension is sought and shall be served by the moving party upon the other parties and the Mediator. Objections to the request must be promptly communicated to the County and to the Mediator.

The County, with the concurrence of the designated Mediator, may grant the request by adjusting the time for completion of the conference.

- D Recesses.** The Mediator may recess the mediation conference at any time and may set times for reconvening. If the Mediator determines the time and place where the conference is to reconvene before the conference is recessed, no further notice is required to persons present at the conference.

- E Project Delay.** The mediated settlement conference that results from a construction contract dispute shall not be cause for the delay of the construction project.

### **RULE 4 DUTIES OF PARTIES AND OTHER PARTICIPANTS IN FORMAL DISPUTE RESOLUTION PROCESS**

**A Attendance**

1. All parties to the dispute must designate an official representative to attend the mediation.
2. "Attendance" means physical attendance, not by telephone or other electronic means. Any attendee representing a party must have authority from that party to bind it to any agreement reached as a result of the mediation.
3. Attorneys representing parties may attend the mediation, but are not required to do so.
4. Sureties and insurance company representatives are required to physically attend the mediation unless the Mediator and all of the other parties to the mediation excuse their attendance or consent to their attendance by telephone or other electronic means.
5. The parties who attend a duly scheduled mediation conference shall have the right to recover their share of the Mediator's compensation from any party or parties who fail to attend the conference without good cause.

**B Finalizing Agreement.** If an agreement is reached in the conference, the terms of the agreement shall be confirmed in writing and signed by all parties.

**C Mediation Fees** charged by the Mediator shall be paid in accordance with G.S. § 143-128(f1).

**D Failure to compensate Mediator.** Any party's failure to compensate the Mediators in accordance with G.S. § 143-128(f1) shall subject that party to a withholding of said amount of money from the party's monthly payment by the County.

Should the County fail to compensate the Mediator, it shall hereby be subject to a civil cause of action from the Mediator for the 1/3 portion of the Mediator's total fee as required by G.S. § 143-128(f1).

**RULE 5 AUTHORITY AND DUTIES OF MEDIATORS**

**A Authority of Mediator**

1. Control of Conference. The Mediator shall at all times be in control of the conference and the procedures to be followed.
2. Private Consultation. The Mediator may communicate privately with any participant or counsel prior to and during the conference. The fact that



private communications have occurred with a participant shall be disclosed to all other participants at the beginning of the conference.

3. Scheduling the Conference. The Mediator shall make a good faith effort to schedule the conference at a time that is convenient with the participants, attorneys and Mediator. In the absence of agreement, the Mediator shall select the date for the conference.
4. Determining good cause for a party's failure to appear at a scheduled mediation conference.

## **B Duties of Mediator**

1. The Mediator shall define and describe the following at the beginning of the conference:
  - a. The process of mediation.
  - b. The difference between mediation and other forms of conflict resolution.
  - c. The costs of the mediated settlement conference.
  - d. That the mediated settlement conference is not a trial, the Mediator is not a judge, and the parties retain their legal rights if they do not reach settlement; however, the Mediator will advise all parties that failure to appear at mediation without good cause may result in imposition of sanctions and may be asserted as a bar to lawsuits by claimants who have failed to exhaust this administrative remedy.
  - e. The circumstances under which the Mediator may meet and communicate privately with any of the parties or with any other person.
  - f. Whether and under what conditions communications with the Mediator will be held in confidence during the conference.
  - g. The inadmissibility of conduct and statements as provided by GS §7A-38.1(1).
  - h. The duties and responsibilities of the Mediator and the participants.
  - i. That any agreement reached will be reached by mutual consent.
2. Disclosure: The Mediator has a duty to be impartial and to advise all participants of any possible bias, prejudice or partiality.
3. Declaring Impasse: The Mediator may determine at any time during the mediation conference that an impasse exists and that the conference should end.
4. Reporting Results of Conference. The Mediator shall submit a written report to the County and the other parties within 10 days of the conference stating whether or not the parties reached an agreement. The Mediator's

report shall indicate the absence of any party from the mediated settlement conference without permission or good cause.

5. Scheduling and Holding the Conference. It is the duty of the Mediator to schedule the conference and conduct it prior to the deadline of completion set by the rules. The Mediator shall strictly observe deadlines for completion of the conference unless said time limit is changed by agreement of the parties.

**RULE 6      COMPENSATION OF THE MEDIATOR**

- A**      The parties shall compensate the Mediator for mediation services at the rate proposed by the Mediator and agreed to by the parties at the time the Mediator is selected.

**RULE 7      RULE MAKING**

- A**      These Rules may be amended by the County at any time. Amendments will not affect mediations where claims and/or requests for mediation have been filed at the time the amendment takes effect

**RULE 8      DEFINITIONS**

- A**      “County” shall mean the County of Wake, North Carolina
- B**      “Project Designer” is that person or firm stipulated as project designer in the Contract Documents for the project.
- C**      “Claim” is a demand or assertion by a party seeking adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term “Claim” also includes other disputes and matters in question between the parties to a Contract involved in the County’s building construction renovation and repair projects arising out of or relating to the Contract or the construction process. Claims must be initiated by a written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.
- D**      “Good Cause” generally includes any circumstance beyond the control of a party, which prevents that party from meeting obligations. When good cause is asserted as an excuse for a party’s failure to appear at a mediation conference or to otherwise comply with the requirements of these Rules, the Mediator, in his or her sole discretion, will determine whether good cause exists to excuse the party’s failure to appear or otherwise comply with these rules.

**RULE 9      TIME LIMITS**

- A** Any time limit provided for by these Rules may be waived or extended at the sole discretion of the County if no Mediator has been selected and at the discretion of the County with concurrence of the Mediator if a Mediator has been selected.



## *MEDIATOR LIST*

<b>Name</b>	<b>Bar #</b>	<b>Address</b>	<b>Phone</b>	<b>Fax</b>	<b>Email</b>
David M. Barnes	12854	PO Box 10096 Raleigh, NC 27605	919-783-2812	919-783-1075	dmbarnes@popynerspruill.com
Robert Beason	5502	PO Box 52270 Durham, NC 27717	919-419-8979	919-403-8533	rbeason@beasonellis.com
William A. Blancato	12729	633 W. 4 <sup>TH</sup> Street, Suite 150 Winston-Salem, NC 27101	336-725-9416	336-725-5129	blancato@bdl-law.com
Richard T. Boyette	7623	PO Box 27808 Raleigh, NC 27611	919-828-5100	919-828-2277	rtb@cshlaw.com
Jacqueline R. Clare	10277	1011 Vance Street Raleigh, NC 27608	919-755-9979	919-755-9512	jclare@mindspring.com
Thomas C. Duncan	1255	PO Box 989 Greensboro, NC 27402	910-379-1390	910-379-1198	duncan@hillevans.com
Sidney Smith Eagles	1271	PO Box 27525 Raleigh, NC 27611	919-755-8771	919-755-8800	sid.eagles@smithmoorelaw.com
Rene Stemple Ellis	DC/P A	PO Box 52270 Durham, NC 27712	919-417-9979	919-403-8533	rellis@beasonellis.com
Marshall Gallop	6626	PO Box 7100 Rocky Mount, NC 27804	252-937-2200	252-937-8100	mgallop@bwsww.com
Allen Holt Gwyn		PO Box 20744 Greensboro, NC 27420	336-691-9222	336-691-9259	ahgwyn@cgspllc.com
Jonathan R. Harkavy	5238	PO Box 29269 Greensboro, NC 27429	336-370-4200	336-274-8490	jharkavy@aol.com
Joseph R. John	2361	11800 Black Horse Run Raleigh, NC 27613	919-676-8796	919-676-8796	jo638sr@aol.com
J. Anderson Little	6730	PO Box 16205 Chapel Hill, NC 27514	919-967-6611	919-967-3212	jandersonlittle@nc.rr.com
James D. Llewellyn	2732	PO Box 567 Atlantic Beach, NC 28512	252-559-2714	252-726-1973	judgelew@embarqmail.com

<b>Name</b>	<b>Bar #</b>	<b>Address</b>	<b>Phone</b>	<b>Fax</b>	<b>Email</b>
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Peter M. McHugh	6269	915 Country Club Drive Reidsville, NC 27320	336-361-9557	336-361-9569	pmchugh@triad.rr.com
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Jeffrey B. Parsons	16006	PO Box 30933 Raleigh, NC 27622	919-789-9242	919-789-9242	jparsons@cgspllc.com
J. Dickson Phillips	8941	PO Drawer 4825 Chapel Hill, NC 27515	919-967-8989	919-419-1429	dphilips@lapgh.com
Lacy M. Presnell	7272	PO Box 10867 Raleigh, NC 27605	919-782-1441	919-782-2311	lpresnell@bdppa.com
John L. Shaw	3950	PO Box 10096 Raleigh, NC 27605	919-783-6400	919-783-1075	jshaw@poynerspruill.com
Edwin M. Speas	4112	PO Box 10096 Raleigh, NC 27607	919-783-6400	919-783-1075	espeas@poynerspruill.com
Odes L. Stroupe	4983	3105 Glenwood Ave., Suite 300 Raleigh, NC 27612	919-881-0338	919-881-9548	stroupe@bcs-law.com
Arthur A. Vreeland	6899	4 Parkmont Court Greensboro, NC 27408	336-288-7500	336-288-7500	aavreeland@aol.com
Charles P. Younce	4891	PO Box 3486 Greensboro, NC 27402	336-379-0123	336-379-9894	cyounce@jymmllaw.com
Julia F. Youngman	21320	PO Box 33550 Raleigh, NC 27636	919-865-7000	919-865-7010	julie_youngman@elliswinters.com







**SECTION 01 1000 - SUMMARY**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. Section Includes:

- 1. Project information.
- 2. Work covered by Contract Documents.
- 3. Owner-furnished/Owner-installed (OFOI) products.
- 4. Contractor's use of site and premises.
- 5. Coordination with occupants.
- 6. Work restrictions.
- 7. Specification and Drawing conventions.
- 8. Miscellaneous provisions.

B. Related Requirements:

- 1. Section 01 5000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
- 2. Section 01 5000 "Temporary Facilities and Controls" for restricted use of the existing elevators.

**1.3 PROJECT INFORMATION**

A. Project Identification: Wake County Office Building – 12th & 14<sup>th</sup> Floors Upfit.

- 1. Project Location: 337 S. Salisbury Street, Raleigh, NC 27601.

B. Owner: Wake County.

- 1. Owner's Representative: David Rutherford.

C. Architect: Huffman Architects, PA; 632 Pershing Road, Raleigh, NC 27608.

- 1. Architect's Representative: Eric Sowers, AIA LEED AP BD+C.

D. Architect's Consultants: The Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

- 1. Mechanical, Electrical, Plumbing, and Fire Protection: HDM Associates, Inc.; 106 Tarheel Court, Suite 100, Elizabeth City, NC 27909.

**1.4 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The Work of Project is defined by the Contract Documents and consists of the following:
  - 1. The project includes renovation of the 12th and 14<sup>th</sup> Floors of the Wake County Office Building. Both floors will be demolished in a separate contract to expose the structure throughout with the intention of building the floors back up. The work includes architectural, mechanical, electrical, plumbing and fire protection systems installations as required for the new layout.
- B. Type of Contract:
  - 1. Project will be constructed under a single prime contract.

**1.5 OWNER-FURNISHED/OWNER-INSTALLED (OFOI) PRODUCTS**

- A. The Owner will furnish and install products indicated.
- B. Owner-Furnished/Owner-Installed (OFOI) Products:
  - 1. Furniture.

**1.6 CONTRACTOR'S USE OF SITE AND PREMISES**

- A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. 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: Confine construction operations to the interior of the building.
  - 2. Driveways, Walkways and Entrances: Keep driveways, loading 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.
    - b. Deliveries must be made between 6:00 p.m. and 6:00 a.m.
    - c. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
  - 1. The fire protection system shall remain fully active during the entire demolition and construction periods.

1.7 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy other floors of the building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
  - 2. Provide not less than 7 days' notice to Owner of activities that will affect Owner's operations.

1.8 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 in the existing building to daytime hours of 6:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated.**
  - 1. Weekend Hours: As approved by the Owner.
  - 2. Early Morning Hours: As approved by the Owner and authorities having jurisdiction.
  - 3. Hours for Utility Shutdowns: As approved by the Owner.
  - 4. Hours for High Noise Activities: As approved by the Owner.
  - 5. Hours for Fire Alarm Shutdown: As approved by the Owner.
- 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 7 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 Owner occupancy with Owner.
  - 1. Notify Owner not less than 7 days in advance of proposed disruptive operations.
  - 2. Obtain Owner's written permission before proceeding with disruptive operations.
  - 3. Any activities that may result in a high level of noise and vibration, dust, odor, or other disruption to the Owner occupants must be done between 6:00 p.m to 6:00 a.m. or during weekends as approved by the Owner.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages and other controlled substances on Owner's property is not permitted.
- F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

#### 1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: 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. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
  3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
  4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following 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.
  3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

#### 1.10 PROJECT REQUIREMENTS

- A. It is imperative that the Contractor make every effort to meet the designated contract time.
- B. All submittals and shop drawings shall be submitted to the Architect for review within two weeks after the Contractor has received the fully executed contract.
- C. The Contractor shall make the Architect aware of any long lead items that may affect the completion of the project within the contractual contract time no later than 7 days prior to the Bid Opening date.
- D. The General Contractor must submit detailed drawings illustrating the integration of different trades' work, highlighting potential conflicts and ensuring proper fit between various systems, requiring approval before proceeding with installation. See additional requirements in the Plumbing, Mechanical, Electrical, Fire Protection, and Fire Alarm specifications.

**WAKE COUNTY OFFICE BUILDING  
12th & 14th Floors Upfit**

**Huffman Architects, PA**

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01 1000**



**SECTION 01 2100 - ALLOWANCES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements governing allowances.
  - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
  - 1. Lump-sum allowances.
- C. Related Requirements:
  - 1. Section 01 2200 "Unit Prices" for procedures for using unit prices.

**1.3 SELECTION AND PURCHASE**

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

**1.4 ACTION SUBMITTALS**

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

**1.6 COORDINATION**

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

**1.7 LUMP-SUM ALLOWANCES**

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
  - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

**1.8 ADJUSTMENT OF ALLOWANCES**

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
  - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
  - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
  - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
  - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
  - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
  - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.



**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

**3.2 PREPARATION**

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

**3.3 SCHEDULE OF ALLOWANCES**

- A. Allowance No. 1: Lump-Sum Allowance: Include the sum of \$35,000.00 for voice/data. The General Contractor shall bid the voice/data work out to a list of vendors provided by the owner. The cost of this work shall be applied to the Allowance. All voice/data infrastructure, as shown in the bid documents, shall be included as part of the base bid.
- B. Allowance No. 2: Lump-Sum Allowance: Include the sum of \$80,000.00 for security installation. The General Contractor shall bid the security work out to a list of vendors provided by the Owner. The cost of this work shall be applied to the Allowance.
- C. Allowance No. 3: Lump-Sum Allowance: Include the sum of \$15,5000.00 for the F10 carpet tile.
- D. Allowance No. 4: Lump-Sum Allowance: Include the sum of \$15,900.00 for the F20 carpet tile.
- E. Allowance No. 5: Lump-Sum Allowance: Include the sum of \$7,000.00 for the F30 carpet tile.
- F. Allowance No. 6: Lump-Sum Allowance: Include the sum of \$1,500.00 for the F40 floor tile.
- G. Allowance No. 7: Lump-Sum Allowance: Include the sum of \$2,900.00 for the F50 VCT.
- H. Allowance No. 8: Lump-Sum Allowance: Include the sum of \$2,500.00 for the B40 base tile.
- I. Allowance No. 9: Lump-Sum Allowance: Include the sum of \$6,200.00 for the W30 wall tile.
- J. Allowance No. 10: Lump-Sum Allowance: Include the sum of \$9,000 for the W40 mosaic tile.
- K. Allowance No. 11: Unit-Cost Allowance: Plaster Patching.
  - 1. Coordinate allowance adjustment with corresponding unit-price requirements in Section 01 2200 "Unit Prices."
  - 2. Allowance Quantity: 20 SF.

**END OF SECTION 01 2100**



**SECTION 01 2200 - UNIT PRICES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
  - 1. Section 01 2600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

- A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 SCHEDULE OF UNIT PRICES**

- A. Unit Price 1: Wall and Ceiling exit signs.
  - 1. Description: Provide one wall or ceiling mounted exit sign and connect to adjacent circuit. Unit price shall include 50 LF of wiring and all materials and labor to complete installation.
  - 2. Unit of Measurement: Each.
  
- B. Unit Price 2: Fire alarm speaker/strobe.
  - 1. Description: Provide one fire alarm speaker/strobe. Unit price shall include 20 LF of conduit and cables and all materials and labor to complete installation.
  - 2. Unit of Measurement: Each.
  
- C. Unit Price 3: Duplex/Quad receptacle.
  - 1. Description: Provide one wall-mounted 20 Amp duplex receptacle and connect to the adjacent circuit. Unit price shall include 25 LF of conduit, wiring, and all materials and labor to complete installation.
  - 2. Unit of Measurement: Each.
  
- D. Unit Price 4: Sprinkler head.
  - 1. Description: Provide one sprinkler head with chrome recessed mount. Unit price shall include 30 LF of pipe, associated fittings, and all materials and labor to complete installation.
  - 2. Unit of Measurement: Each.
  
- E. Unit Price 5: Data drop.
  - 1. Description: Provide one data drop device box and conduit to above lay-in ceiling consisting of one (1) faceplate, two (2) jacks (red and ivory), two (2) CAT-6 cables, and 100 LF of home run. Unit price shall include all materials and labor to complete installation.
  - 2. Unit of Measurement: Each.
  
- F. Unit Price 6: Plaster Patching.
  - 1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
  - 2. Unit of Measurement: Square foot.
  - 3. Include the following in the unit price:
    - a. 20 square feet of patching of deteriorated plaster ceilings as specified in Section 09 2400 "Plaster Patching."
  - 4. Include all other related costs in the Contract Sum.

**END OF SECTION 01 2200**

**SECTION 01 2300 - ALTERNATES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

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

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 SCHEDULE OF PREFERRED ALTERNATES**

Preferred Alternate 1: Mechanical Locksets – Provide Schlage L9000 series mortise locksets to match the existing building locksets.

Preferred Alternate 2: Electromechanical Locksets – Provide Schlage L9000 series mortise locksets to match the existing building locksets.

Preferred Alternate 3: Electromechanical Exit Devices – Provide Sargent 80 series exit devices to match the existing building devices.

Preferred Alternate 4: Cylinders – Provide Corbin Russwin to match the existing building devices.

**END OF SECTION 01 2300**

**SECTION 01 2500 - SUBSTITUTION PROCEDURES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 01 6000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit each request for consideration electronically to the architect via email no more than 7 days prior to the Bid Opening date. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use CSI Form 13.1A.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size,

durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation. Architect will notify Contractor of acceptance or rejection of proposed substitution via Addendum during the bid phase.
- a. Forms of Acceptance: will be issued via Addendum.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

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

## 1.6 PROCEDURES

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

## **PART 2 - PRODUCTS**

### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 7 days prior to the Bid Opening Date.



1. Conditions: 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.
  - 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 contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
  
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
  
1. Conditions: 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 offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
  - b. Requested substitution does not require extensive revisions to the Contract Documents.
  - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - d. Requested substitution provides sustainable design characteristics that specified product provided.
  - e. Substitution request is fully documented and properly submitted.
  - f. Requested substitution will not adversely affect Contractor's construction schedule.
  - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - h. Requested substitution is compatible with other portions of the Work.
  - i. Requested substitution has been coordinated with other portions of the Work.
  - j. Requested substitution provides specified warranty.
  - k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01 2500**



**SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
  - 1. Section 01 2500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within 14 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    - e. Quotation Form: Use forms acceptable to Architect.

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include costs of labor and supervision directly attributable to the change.
  - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - 6. Comply with requirements in Section 01 2500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  - 7. Proposal Request Form: Use form acceptable to Architect.

**1.5 CHANGE ORDER PROCEDURES**

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

**1.6 CONSTRUCTION CHANGE DIRECTIVE**

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01 2600**

**SECTION 01 2900 - PAYMENT PROCEDURES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Section 01 2600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 2. Section 01 3200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 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.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven (7) calendar days after the Notice to Proceed.
- B. 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. Name of Architect.
  - c. Architect's project number.
  - d. Contractor's name and address.
  - e. 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.
      - 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. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
  5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  6. 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. If required, include evidence of insurance.
  7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
  8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
  9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
    - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
  10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

**1.5 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.
  - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the 5th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and 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 Construction Change Directives 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. Differentiate between items stored on-site and items stored off-site.
  - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  - 2. 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.
  - 3. 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.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Electronically submit signed and notarized copy of each Application for Payment to Architect by a method ensuring receipt within 24 hours. Application shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. 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. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. 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 (preliminary if not final).
  4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  5. Products list (preliminary if not final).
  6. Schedule of unit prices.
  7. Submittal schedule (preliminary if not final).
  8. List of Contractor's staff assignments.
  9. List of Contractor's principal consultants.
  10. Copies of building permits.
  11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  12. Initial progress report.
  13. Report of preconstruction conference.
  14. Certificates of insurance and insurance policies.
  15. Performance and payment bonds.
  16. Data needed to acquire Owner's insurance.
- J. 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.
  2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. 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.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."



7. Evidence that claims have been settled.
8. 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.
9. Final liquidated damages settlement statement.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01 2900**



**SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. Requests for Information (RFIs).
  - 4. Project meetings.
- B. Related Requirements:
  - 1. Section 01 3200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Section 01 7300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Section 01 7700 "Closeout Procedures" for coordinating closeout of the Contract.

**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. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
  - 1. Post copies of list in project meeting room, in temporary field office and by each temporary telephone. Keep list current at all times.

**1.4 GENERAL COORDINATION PROCEDURES**

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. 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. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials. Coordinate use of temporary utilities to minimize waste.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

**1.5 COORDINATION DRAWINGS**

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
  - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

- a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
  - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
  - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
  - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
  - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
  - f. Indicate required installation sequences.
  - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
  2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
  3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
  4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
  5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
  6. Mechanical 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.
  7. Electrical Work: Show the following:
    - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
  8. Fire-Protection System: Show the following:

- a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
  9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If 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 changes as directed and resubmit.
  10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 3300 "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
  2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
- 1.6 REQUESTS FOR INFORMATION (RFIs)
- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of 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 of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 2600 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 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 at intervals acceptable to the Architect. 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.
- 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 seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- 1.7 PROJECT MEETINGS
- A. General: Architect will 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.

2. Minutes: Architect will record significant discussions and agreements achieved and distribute the meeting minutes to everyone concerned.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
  2. Attendees: Authorized representatives of Owner, Architect and their consultants; Contractor and its superintendent; major subcontractors; 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.
  3. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Lines of communications.
    - f. Procedures for processing field decisions and Change Orders.
    - g. Procedures for RFIs.
    - h. Procedures for testing and inspecting.
    - i. Procedures for processing Applications for Payment.
    - j. Distribution of the Contract Documents.
    - k. Submittal procedures.
    - l. Preparation of record documents.
    - m. Use of the premises and existing building.
    - n. Work restrictions.
    - o. Working hours.
    - p. Owner's occupancy requirements.
    - q. Responsibility for temporary facilities and controls.
    - r. Procedures for moisture and mold control.
    - s. Procedures for disruptions and shutdowns.
    - t. Construction waste management and recycling.
    - u. Parking availability.
    - v. Office, work, and storage areas.
    - w. Equipment deliveries and priorities.
    - x. First aid.
    - y. Security.
    - z. Progress cleaning.
  4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect 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 RFIs.
  - d. Related Change Orders.
  - e. Purchases.
  - f. Deliveries.
  - g. Submittals.
  - h. Review of mockups.
  - i. Possible conflicts.
  - j. Compatibility requirements.
  - k. Time schedules.
  - l. Weather limitations.
  - m. Manufacturer's written instructions.
  - n. Warranty requirements.
  - o. Compatibility of materials.
  - p. Acceptability of substrates.
  - q. Temporary facilities and controls.
  - r. Space and access limitations.
  - s. Regulations of authorities having jurisdiction.
  - t. Testing and inspecting requirements.
  - u. Installation procedures.
  - v. Coordination with other work.
  - w. Required performance results.
  - x. Protection of adjacent work.
  - y. 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.
- D. 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, 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. Submittal of written warranties.
    - d. Requirements for preparing operations and maintenance data.
    - e. Requirements for delivery of material samples, attic stock, and spare parts.
    - f. Requirements for demonstration and training.
    - g. Preparation of Contractor's punch list.
    - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - i. Submittal procedures.

- j. Owner's partial occupancy requirements.
  - k. Installation of Owner's furniture, fixtures, and equipment.
  - l. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct at regular intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
  - 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Review and correct or 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 utilization.
      - 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.
      - 17) Pending claims and disputes.
      - 18) Documentation of information for payment requests.
  - 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    - 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.

- F. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined 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.
    - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each contractor 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 utilization.
      - 8) Temporary facilities and controls.
      - 9) Work hours.
      - 10) Hazards and risks.
      - 11) Progress cleaning.
      - 12) Quality and work standards.
      - 13) Change Orders.
  3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01 3100**



**SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Startup construction schedule.
  - 2. Contractor's construction schedule.
  - 3. Construction schedule updating reports.
  - 4. Daily construction reports.
  - 5. Material location reports.
  - 6. Site condition reports.
  - 7. Special reports.
- B. Related Requirements:
  - 1. Section 01 3300 "Submittal Procedures" for submitting schedules and reports.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.

- F. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. PDF electronic file.
- B. Startup construction schedule.
  - 1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
  - 3. Total Float Report: List of all activities sorted in ascending order of total float.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at monthly intervals.
- H. Special Reports: Submit at time of unusual event.
- I. Qualification Data: For scheduling consultant.

**1.5 QUALITY ASSURANCE**

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
  
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
  - 1. Review software limitations and content and format for reports.
  - 2. Verify availability of qualified personnel needed to develop and update schedule.
  - 3. Discuss constraints, including work stages, area separations, interim milestones and partial Owner occupancy.
  - 4. Review delivery dates for Owner-furnished products.
  - 5. Review schedule for work of Owner's separate contracts.
  - 6. Review submittal requirements and procedures.
  - 7. Review time required for review of submittals and resubmittals.
  - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
  - 9. Review time required for Project closeout and Owner startup procedures.
  - 10. Review and finalize list of construction activities to be included in schedule.
  - 11. Review procedures for updating schedule.

**1.6 COORDINATION**

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
  - 1. Secure time commitments for performing critical elements of the Work from entities involved.
  - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

**PART 2 - PRODUCTS**

**2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL**

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
  
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  - 1. Activity Duration: Define activities so no activity is longer than 14 days, unless specifically allowed by Architect.

2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
    - a. Lighting.
    - b. Millwork.
    - c. Doors.
    - d. Storefront.
    - e. Metal Panel Ceilings.
    - f. Flooring.
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 3300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.
1. Work under More Than One Contract: Include a separate activity for each contract.
  2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 1000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 1000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  5. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.



- i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - l. Building flush-out.
    - m. Startup and placement into final use and operation.
  
  - 7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Temporary enclosure and space conditioning.
    - c. Permanent space enclosure.
    - d. Completion of mechanical installation.
    - e. Completion of electrical installation.
    - f. Substantial Completion.
  
  - D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
  
  - E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
    - 1. See Section 01 2900 "Payment Procedures" for cost reporting and payment procedures.
  
  - F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
    - 1. Unresolved issues.
    - 2. Unanswered Requests for Information.
    - 3. Rejected or unreturned submittals.
    - 4. Notations on returned submittals.
    - 5. Pending modifications affecting the Work and Contract Time.
  
  - G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
  
  - H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- 2.2 STARTUP CONSTRUCTION SCHEDULE
- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.
  
  - B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

**2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)**

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
  - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.
    - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
  - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
  - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
  - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
  - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Utility interruptions.
    - g. Installation.
    - h. Work by Owner that may affect or be affected by Contractor's activities.
    - i. Testing.
    - j. Punch list and final completion.
    - k. Activities occurring following final completion.
  - 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
  - 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
  - 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

- a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
- a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
  - b. Total cost assigned to activities shall equal the total Contract Sum.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Main events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.
  6. Early and late finish dates.
  7. Activity duration in workdays.
  8. Total float or slack time.
  9. Average size of workforce.
  10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations in workdays.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.
- H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
  2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
  3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
  4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

- a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
- b. Submit value summary printouts one week before each regularly scheduled progress meeting.

## 2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  1. List of subcontractors at Project site.
  2. List of separate contractors at Project site.
  3. Approximate count of personnel at Project site.
  4. Equipment at Project site.
  5. Material deliveries.
  6. High and low temperatures and general weather conditions, including presence of rain or snow.
  7. Accidents.
  8. Meetings and significant decisions.
  9. Unusual events (see special reports).
  10. Stoppages, delays, shortages, and losses.
  11. Meter readings and similar recordings.
  12. Emergency procedures.
  13. Orders and requests of authorities having jurisdiction.
  14. Change Orders received and implemented.
  15. Construction Change Directives received and implemented.
  16. Services connected and disconnected.
  17. Equipment or system tests and startups.
  18. Partial completions and occupancies.
  19. Substantial Completions authorized.

## 2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within two days of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

## **PART 3 - EXECUTION**

### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

**END OF SECTION 01 3200**



**SECTION 01 3300 - SUBMITTAL PROCEDURES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
  - 1. Section 01 2900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 2. Section 01 3200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 3. Section 01 7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 4. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

**1.3 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require 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. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

**1.4 ACTION SUBMITTALS**

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing,

fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
  - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
  - a. Scheduled date for first submittal.
  - b. Specification Section number and title.
  - c. Submittal category: Action; informational.
  - d. Name of subcontractor.
  - e. Description of the Work covered.
  - f. Scheduled date for Architect's final release or approval.
  - g. Scheduled date of fabrication.
  - h. Scheduled dates for installation.
  - i. Activity or event number.

#### 1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
  1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
    - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    - b. Digital Drawing Software Program: The Contract Drawings are available in Portable Document Format (PDF).
    - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
    - d. The following digital data files will be furnished for each appropriate discipline:
      - 1) Floor plans.
      - 2) Reflected ceiling plans.
- 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.



3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. 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 enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 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. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 15 days for review of each resubmittal.
  4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
  5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
  3. Include the following information for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Name of subcontractor.
    - g. Name of supplier.
    - h. Name of manufacturer.
    - i. Submittal number or other unique identifier, including revision identifier.
      - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
    - j. Number and title of appropriate Specification Section.
    - k. Drawing number and detail references, as appropriate.
    - l. Location(s) where product is to be installed, as appropriate.
    - m. Other necessary identification.

4. Additional Paper 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.
    - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
  5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
    - a. Transmittal Form for Paper Submittals: Use AIA Document G810.
    - b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
      - 1) Project name.
      - 2) Date.
      - 3) Destination (To:).
      - 4) Source (From:).
      - 5) Name and address of Architect.
      - 6) Name of Construction Manager.
      - 7) Name of Contractor.
      - 8) Name of firm or entity that prepared submittal.
      - 9) Names of subcontractor, manufacturer, and supplier.
      - 10) Category and type of submittal.
      - 11) Submittal purpose and description.
      - 12) Specification Section number and title.
      - 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
      - 14) Drawing number and detail references, as appropriate.
      - 15) Indication of full or partial submittal.
      - 16) Transmittal number, numbered consecutively.
      - 17) Submittal and transmittal distribution record.
      - 18) Remarks.
      - 19) Signature of transmitter.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file 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.
    - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
  4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
    - a. Project name.

- b. Date.
  - c. Name and address of Architect.
  - d. Name of Construction Manager.
  - e. Name of Contractor.
  - f. Name of firm or entity that prepared submittal.
  - g. Names of subcontractor, manufacturer, and supplier.
  - h. Category and type of submittal.
  - i. Submittal purpose and description.
  - j. Specification Section number and title.
  - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
  - l. Drawing number and detail references, as appropriate.
  - m. Location(s) where product is to be installed, as appropriate.
  - n. Related physical samples submitted directly.
  - o. Indication of full or partial submittal.
  - p. Transmittal number, numbered consecutively.
  - q. Submittal and transmittal distribution record.
  - r. Other necessary identification.
  - s. Remarks.
5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
- a. Project name.
  - b. Number and title of appropriate Specification Section.
  - c. Manufacturer name.
  - d. Product name.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. 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.
- I. 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.
- J. 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.

**PART 2 - PRODUCTS**

**2.1 SUBMITTAL PROCEDURES**

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
  3. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
  4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing 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 before or concurrent with Samples.
  6. Submit Product Data in the following format:

- a. PDF electronic file.
  - b. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, 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. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
  3. Submit Shop Drawings in the following format:
    - a. Physical copies of all sample submittals are required. See Section D – “Samples” below. No paper copies of shop drawing or product data submittals will be required except for as required in Spec 01 7823 – “Operation and Maintenance Data”.
- A. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
  1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- B. Coordination Drawing Submittals: Comply with requirements specified in Section 01 3100 "Project Management and Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Section 01 3200 "Construction Progress Documentation."
- D. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 2900 "Payment Procedures."
- E. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 7700 "Closeout Procedures" and Section 01 7701 "Closeout Checklist".
- F. Maintenance Data: Comply with requirements specified in Section 01 7823 "Operation and Maintenance Data."
- G. 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.
- H. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- I. 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.
- J. 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.
- K. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

- L. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- M. 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.
- N. 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.
- O. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- P. 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.
- Q. 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 primers and substrate preparation needed for adhesion.
- R. 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.
- S. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

### **PART 3 - EXECUTION**

#### **3.1 CONTRACTOR'S REVIEW**

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 "Closeout Procedures" and Section 01 7701 "Closeout Checklist".

- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

**3.2 ARCHITECT'S ACTION**

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. 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.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

**END OF SECTION 01 3300**



**SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 01 1000 "Summary" for work restrictions and limitations.

1.3 USE CHARGES

- A. **Electrical Power Service from Existing System: Electrical power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions as required for construction operations.**

1.4 INFORMATIONAL SUBMITTALS

- A. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- B. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
  - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
  - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
  - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- C. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
  - 1. Locations of system dust-control media.
  - 2. Other dust-control measures.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

**PART 2 - PRODUCTS**

2.1 MATERIALS

- A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- B. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).
- C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Contractor may designate space within the renovation area for a field office.
  - 1. Use of the Owner's existing toilet facilities located in the Basement will be allowed provided they are kept clean and in operation.
- B. Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
  - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  - 1. Store combustible materials apart from building.

**PART 3 - EXECUTION**

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. **Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.**
- C. Sanitary Facilities: Provide temporary toilets, wash facilities and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation and maintenance of fixtures and facilities.
  - 1. **Toilets: Use of the Owner's existing toilet facilities located in the Basement will be allowed provided they are kept clean and in operation.**
- D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes and odors from entering unaltered areas.
- E. **Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.**
- F. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel.
  - 1. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- B. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- C. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

- D. Waste Disposal Facilities: Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. The fire protection system shall remain fully active during the entire demolition and construction periods.

- B. Protection of Existing Passenger Elevators: The Contractor shall be responsible for protecting elevator surfaces from damage for the duration of the work, including periodically inspecting and maintaining surface protections as required to prevent damage.

1. Wake County Office Building: In addition to the freight elevator located in the Basement, the Owner shall designate the freight elevator in the tower (Elevator No. 3) for use by the Contractor for transporting materials. No other building elevators shall be used.

- C. Environmental Protection: Provide protection, operate temporary facilities and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 01 1000 "Summary."

- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

- E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

- F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations and similar activities. Provide temporary weathertight enclosure for building exterior, if required.

- G. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Overlap and tape full length of joints.
2. Insulate partitions to control noise transmission to occupied areas.
3. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
4. Provide walk-off mats at each entrance through temporary partition.

**3.5 MOISTURE AND MOLD CONTROL**

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
  - 1. Protect porous materials from water damage.
  - 2. Protect stored and installed material from flowing or standing water.
  - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
  - 4. Remove standing water from decks.
  - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - 1. Keep interior spaces reasonably clean and protected from water damage.
  - 2. Discard or replace water-damaged material.
  - 3. Do not install material that is wet.
  - 4. Discard, replace, or clean stored or installed material that begins to grow mold.
  - 5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

**3.6 OPERATION, TERMINATION, AND REMOVAL**

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. At Substantial Completion, repair, renovate and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

**END OF SECTION 01 5000**



**SECTION 01 6000 - PRODUCT REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 01 2500 "Substitution Procedures" for requests for substitutions.

**1.3 DEFINITIONS**

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

**1.4 ACTION SUBMITTALS**

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
  - a. Form of Approval: As specified in Section 01 3300 "Submittal Procedures."
  - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 3300 "Submittal Procedures." Show compliance with requirements.

#### 1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
  2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

#### 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
  2. Store materials in a manner that will not endanger Project structure.
  3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.



5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

#### 1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

### **PART 2 - PRODUCTS**

#### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," 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 "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:

1. **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.
  2. **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.
  3. **Products:**
    - a. **Restricted List:** 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.
    - b. **Nonrestricted List:** 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. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
  4. **Manufacturers:**
    - a. **Restricted List:** 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.
    - b. **Nonrestricted List:** 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. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
  5. **Basis-of-Design Product:** Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. **Visual Matching Specification:** Where Specifications require "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 01 2500 "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 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: 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 these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  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.

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01 6000**



**SECTION 01 7300 - EXECUTION**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

- 1. Installation of the Work.
- 2. Cutting and patching.
- 3. Progress cleaning.
- 4. Starting and adjusting.
- 5. Protection of installed construction.
- 6. Correction of the Work.

- B. Related Requirements:

- 1. Section 01 1000 "Summary" for limits on use of Project site.
- 2. Section 01 3300 "Submittal Procedures" for submitting surveys.
- 3. Section 01 7700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit a plan describing procedures at least 7 days prior to the time cutting and patching will be performed. Include the following information:

- 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
- 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
- 3. Products: List products to be used for patching and firms or entities that will perform patching work.
- 4. Dates: Indicate when cutting and patching will be performed.

5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
  - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

## 1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
  2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Mechanical systems piping and ducts.
    - f. Control systems.
    - g. Communication systems.
    - h. Fire-detection and -alarm systems.
    - i. Conveying systems.
    - j. Electrical wiring systems.
    - k. Operating systems of special construction.
  3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## **PART 2 - PRODUCTS**

### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.

- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examination and Acceptance of Conditions: Before proceeding with the Work, examine substrates, areas and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

#### **3.2 PREPARATION**

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 3100 "Project Management and Coordination."

#### **3.3 INSTALLATION**

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners and installation materials that are not considered hazardous.
- 3.4 CUTTING AND PATCHING
- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.



- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 1000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Fill material shall be a with a

3000 PSI concrete. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
  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. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."

- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period.

**3.6 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

**END OF SECTION 01 7300**



**SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Disposing and/or recycling of nonhazardous construction waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Disposal: Removal off-site of construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- C. Recycle: Recovery of construction waste for subsequent processing in preparation for reuse.
- D. Salvage: Recovery of construction waste and subsequent sale or reuse.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:
  - 1. Construction Waste:
    - a. Masonry and CMU.
    - b. Metals.
    - c. Insulation.
    - d. Carpet.
    - e. ACT.
    - f. Aluminum mini blinds.
    - g. Gypsum board.
    - h. Piping.
    - i. Electrical conduit.
    - j. Lighting fixtures.

- k. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
  - 1) Paper.
  - 2) Cardboard.
  - 3) Boxes.
  - 4) Plastic sheet and film.
  - 5) Polystyrene packaging.
  - 6) Wood crates.
  - 7) Plastic pails.

**B. Submittals:**

- 1. Written Construction Waste Management Plan.
- 2. Final record report showing actual recycle quantities and percentage of overall project waste.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 RECYCLING CONSTRUCTION WASTE, GENERAL**

- A. General: Contractor shall provide a written plan, identify where products will go and submit a final report at closeout. All subcontractors shall be made aware of the goal and shall be provided with a copy of the written Waste Management Plan.
- B. Recycle paper and beverage containers used by on-site workers.
- C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- D. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- E. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
  - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.
6. Maintain record of pull tickets from the recycle hauling companies. Include with Final Report.

### 3.2 RECYCLING CONSTRUCTION WASTE

#### A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

#### B. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

### 3.3 DISPOSAL OF WASTE

#### A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

#### B. Burning: Do not burn waste materials.

#### C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

**END OF SECTION 01 7419**





**SECTION 01 7700 - CLOSEOUT PROCEDURES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final Completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Requirements:
  - 1. Section 01 7300 "Execution" for progress cleaning of Project site.
  - 2. Section 07 7701 "Closeout Checklist" for specific Closeout requirements.
  - 3. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 4. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

**1.6 SUBSTANTIAL COMPLETION PROCEDURES**

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
  
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
  - 5. Submit changeover information related to Owner's occupancy, use, operation and maintenance.
  
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  - 3. Complete startup and testing of systems and equipment.
  - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  - 5. Advise Owner of changeover in heat and other utilities.
  - 6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  - 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  - 8. Complete final cleaning requirements, including touchup painting.
  - 9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
  
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
  - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
  - 2. Results of completed inspection will form the basis of requirements for final completion.

**1.7 FINAL COMPLETION PROCEDURES**

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 2900 "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

**1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)**

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first.
  2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.
  4. Submit list of incomplete items in the following format:
    - a. MS Excel electronic file. Architect will return annotated file.

**1.9 SUBMITTAL OF PROJECT WARRANTIES**

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
  - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
  - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

## **PART 3 - EXECUTION**

### **3.1 FINAL CLEANING**

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.

- f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
  - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  - h. Sweep concrete floors broom clean in unoccupied spaces.
  - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
  - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - k. Remove labels that are not permanent.
  - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
  - p. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."

### 3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
  - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
  - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

**WAKE COUNTY OFFICE BUILDING  
12th & 14th Floors Upfit**

**Huffman Architects, PA**

**END OF SECTION 01 7700**

**PROJECT CLOSE-OUT CHECK LIST**

Project: **Wake County Office Building – 12th & 14th Floors Upfit**

Page 1

<u>TASK DESCRIPTION</u>	<u>COMPLETED</u>	<u>DATE</u>
A. General Requirements		
1. Certificate of Substantial Completion (AIA G704) (Executed by Designer, Contractor and Owner)	_____	_____
2. Inspections Certifications		
a. Certificate of Occupancy (By Building Inspections Officials)	_____	_____
b. Copy of Building Official Inspection Card (Showing required inspection approvals)	_____	_____
c. Regulatory Inspection Sign-Offs (as applicable)		
(1) General Contract	_____	_____
(2) Plumbing Subcontract	_____	_____
(3) Fire Protection Contract	_____	_____
(4) Mechanical Contract	_____	_____
(5) Electrical Contract	_____	_____
(6) Certification Reports for All Backflow Assemblies (Includes Plumbing, HVAC, Fire Protection as applicable)	_____	_____
(7) Well Water Quality Test Report (if applicable)	_____	_____
(8) Other Certifications as Required (NCDFS, NC DOT, NC Land Quality, Local Government, Utilities, Health Dept., Fireproofing Certification, Structural Steel Inspection Certification, etc.)	_____	_____
3. Closeout Reports & Documentation		
a. Owner Instruction and Training with Equipment and Systems (Memo/List of Attendees required for each session)	_____	_____
b. HVAC Test and Balance Report (Approval cover letter from Designer required)	_____	_____
c. Attic Stock Turnover (Transfer to Owner with Typed Inventory Required)	_____	_____
d. Keys & Permanent Hardware Changeover (Delivery of Final Keys and Cabinet to Owner; Memo of Hardware Changeover Date)	_____	_____

**PROJECT CLOSE-OUT CHECK LIST**

Project: **Wake County Office Building – 12th & 14th Floors Upfit**

Page 2

<u>TASK DESCRIPTION</u>	<u>COMPLETED</u>	<u>DATE</u>
e. Insurance Coverage Change Over	_____	_____
f. Utility Account Change Over		
(1) Electric Service	_____	_____
(2) Gas Service	_____	_____
(3) Water Service	_____	_____
(4) Other Utility Service	_____	_____
B. Record Document Requirements		
1. As-built drawings		
a. Site/Civil	_____	_____
b. Architectural & Structural	_____	_____
c. Plumbing	_____	_____
d. Fire Protection	_____	_____
e. Mechanical	_____	_____
f. Electrical	_____	_____
g. Security	_____	_____
h. Other (Kitchen Equipment, etc.)	_____	_____
2. Final Finish Schedule (updated with actual finishes and bound in with O+M Manual)	_____	_____
3. Operation & Maintenance (O+M) Manuals (Approval cover letter from Designer required)	_____	_____
a. Product & Operations Data	_____	_____
b. Maintenance Information	_____	_____
c. Product Warranty Certificates/Maintenance Agreements	_____	_____
3. Shop Drawings – Complete Set (With Architect's Review Stamp)	_____	_____
4. Construction Site Documentation (Contractor's Job Log and Photographs)	_____	_____



**PROJECT CLOSE-OUT CHECK LIST**

Project: **Wake County Office Building – 12th & 14th Floors Upfit**

Page 3

<u>TASK DESCRIPTION</u>	<u>COMPLETED</u>	<u>DATE</u>
C. Final Accounting Requirements – by Contractor		
1. Contractor's Certification Of Completion Of Work	_____	_____
2. Affidavit of Release of Liens (AIA G706A)	_____	_____
3. Affidavit of Payment of Debts and Claims (AIA G706)	_____	_____
4. Consent of Surety to Final Payment (AIA G707)	_____	_____
5. Final Certified NC Sales Tax Report	_____	_____
6. Final MBE Documentation (MBE Form-6)	_____	_____
7. Final Request for Payment Certified by Designer	_____	_____
D. Final Accounting Requirements – by Designer		
1. Cover Letter of Approval of Roof Warranty	_____	_____
2. Cover Letter of Approval for O&M Manuals	_____	_____
3. Certification by Architect of Completed Final Punch List	_____	_____
4. Final Completion Certificate executed by Designer	_____	_____
5. Final Liquidated Damages analysis by Designer		
6. Record Drawings (electronic files + 3 reproducible sets of all drawings based on Contractor As-Builts)	_____	_____
E. Warranty Period		
1. Pre-Expiration Warranty Inspection (Inspection 30 days prior to warranty expiration date)	_____	_____



**SECTION 01 7823 - OPERATION AND MAINTENANCE DATA**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
  - 1. Section 01 3300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Section 07 7701 "Closeout Checklist".

**1.3 DEFINITIONS**

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

**1.4 CLOSEOUT SUBMITTALS**

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. The Architect will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
  - 1. One paper copy and one electronic PDF copy. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.
- C. Submittal Schedule: Comply with the following schedule for submittal of operating and maintenance manuals.

1. Before Substantial Completion, at 80% billing, when each installation that requires submittal of operating and maintenance manuals is nominally complete, submit three copies of each manual to the Architect. Include a complete index or table of contents of each manual.
2. 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. Architect will return copy with comments.
  - a. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

## **PART 2 - PRODUCTS**

### **2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY**

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
  1. List of documents.
  2. List of systems.
  3. List of equipment.
  4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- 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. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### **2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS**

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  1. Title page.
  2. Table of contents.
  3. Manual contents.

- B. Title Page: Include the following information:
1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
  6. Name and contact information for Construction Manager.
  7. Name and contact information for Architect.
  8. Name and contact information for Commissioning Authority.
  9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
  4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) 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. At appropriate locations in manual,

insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

**2.3 EMERGENCY MANUALS**

- A. Content: Organize manual into a separate section for each of the following:
  - 1. Type of emergency.
  - 2. Emergency instructions.
  - 3. Emergency procedures.
  
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  - 1. Fire.
  - 2. Flood.
  - 3. Gas leak.
  - 4. Water leak.
  - 5. Power failure.
  - 6. Water outage.
  - 7. System, subsystem, or equipment failure.
  - 8. Chemical release or spill.
  
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
  
- D. Emergency Procedures: Include the following, as applicable:
  - 1. Instructions on stopping.
  - 2. Shutdown instructions for each type of emergency.
  - 3. Operating instructions for conditions outside normal operating limits.
  - 4. Required sequences for electric or electronic systems.
  - 5. Special operating instructions and procedures.

**2.4 OPERATION MANUALS**

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  - 2. Performance and design criteria if Contractor has delegated design responsibility.
  - 3. Operating standards.
  - 4. Operating procedures.
  - 5. Operating logs.
  - 6. Wiring diagrams.
  - 7. Control diagrams.
  - 8. Piped system diagrams.
  - 9. Precautions against improper use.
  - 10. License requirements including inspection and renewal dates.
  
- B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

**2.5 PRODUCT MAINTENANCE MANUALS**

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.

4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins.
  2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  3. Identification and nomenclature of parts and components.
  4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
  2. Troubleshooting guide.
  3. Precautions against improper maintenance.
  4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  5. Aligning, adjusting, and checking instructions.
  6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.



- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

### **PART 3 - EXECUTION**

#### **3.1 MANUAL PREPARATION**

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original project record documents as part of operation and maintenance manuals.
  - 2. Comply with requirements of newly prepared record Drawings in Section 01 7839 "Project Record Documents."

- G. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

**END OF SECTION 01 7823**

**SECTION 01 7839 - PROJECT RECORD DOCUMENTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.
- B. Related Requirements:
  - 1. Section 01 7300 "Execution" for final property survey.
  - 2. Section 01 7700 "Closeout Procedures" for general closeout procedures.
  - 3. Section 01 7701 "Closeout Checklist" for specific Project Record Documents requirements.

**1.3 CLOSEOUT SUBMITTALS**

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set of marked-up record prints.
  - 2. Number of Copies: Submit copies of record Drawings as follows:
    - 1) Submit one paper-copy set of marked-up record prints.
- B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.
- C. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.
- D. Reports: Submit written report indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

**PART 2 - PRODUCTS**

**2.1 RECORD DRAWINGS**

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Identification: As follows:

- a. Project name.
- b. Date.
- c. Designation "PROJECT RECORD DRAWINGS."
- d. Name of Architect.
- e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
  1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
- B. Format: Submit record Specifications as paper copy.

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  3. Note related Change Orders, record Specifications and record Drawings where applicable.
- B. Format: Submit record Product Data as paper copy.
  1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

## **PART 3 - EXECUTION**

### 3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

**WAKE COUNTY OFFICE BUILDING  
12th & 14th Floors Upfit**

**Huffman Architects, PA**

**END OF SECTION 01 7839**

**SECTION 06 1000 - ROUGH CARPENTRY**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Wood blocking and nailers.

- B. Related Sections:

- 1. Section 06 4116 "Plastic Laminate Faced Architectural Cabinets."

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

- 1. SPIB: The Southern Pine Inspection Bureau.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

- 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
- 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

**PART 2 - PRODUCTS**

**2.1 WOOD PRODUCTS, GENERAL**

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  - 3. Provide dressed lumber, S4S, unless otherwise indicated.

**2.2 WOOD-PRESERVATIVE-TREATED MATERIALS**

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Application: Treat all items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.

**2.3 FIRE-RETARDANT-TREATED MATERIALS**

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- C. Application: Treat items indicated on Drawings.

**2.4 PLYWOOD**

- A. Plywood: Exterior, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.



**2.5 MISCELLANEOUS LUMBER**

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

**2.6 FASTENERS**

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Metal Framing: ASTM C 1002 or ASTM C 954, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

**PART 3 - EXECUTION**

**3.1 INSTALLATION, GENERAL**

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Where wood-preservative-treated lumber is installed adjacent to metal, install continuous flexible flashing separator between wood and metal decking.
- C. Provide blocking as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- D. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- E. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
- F. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- G. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

**3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION**

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.
- D. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

- E. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

**END OF SECTION 06 1000**



**SECTION 06 2023 - INTERIOR FINISH CARPENTRY**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Interior trim.
- B. Related Requirements:
  - 1. Section 06 1000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed.
  - 2. Section 09 9123 "Interior Painting" for priming and backpriming of interior finish carpentry.

**1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
- B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- C. Samples for Verification:
  - 1. For each cut of lumber with non-factory-applied finish, 8 inches (200 mm) long.

**1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

**1.4 FIELD CONDITIONS**

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

- B. Do not install finish carpentry materials that are wet, moisture damaged or mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS, GENERAL**

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber, mark grade stamp on end or back of each piece.
- B. Hardboard: ANSI A135.4.

### **2.2 INTERIOR TRIM (B20)**

- A. Hardwood Lumber Cove Base & Base Cap (Paint per finish schedule):
  - 1. Species and Grade:
    - a. Premium or 2 Common to match existing wood flooring.
  - 2. Maximum Moisture Content: 15 percent.
  - 3. Finger Jointing: Not allowed.
  - 4. Face Surface: Surfaced (smooth).
  - 5. Height: G.C. field verify height needed to cover existing conditions.

### **2.3 MISCELLANEOUS MATERIALS**

- A. Fasteners for Interior Finish Carpentry: Nails, screws and other anchoring devices of type, size, material and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Glue: Aliphatic-resin, polyurethane or resorcinol wood glue recommended by manufacturer for general carpentry use.

### **2.4 FABRICATION**

- A. Back out or kerf backs of transition strips.
- B. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.

**3.3 INSTALLATION, GENERAL**

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true and aligned with adjacent materials.
  - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
  - 2. Where face fastening is unavoidable, countersink fasteners, fill surface flush and sand unless otherwise indicated.
  - 3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
  - 4. Coordinate interior finish carpentry with materials and systems in or adjacent to it.
- C. Re-work existing wood base where indicated for new construction.

**3.4 INSTALLATION OF INTERIOR TRIM**

- A. Install transition strips with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
  - 1. Match color and grain pattern of transition strips for transparent finish (stain or clear finish) across joints.
  - 2. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
  - 3. Fasten to prevent movement or warping.
  - 4. Countersink fastener heads on exposed carpentry work and fill holes.

**3.5 ADJUSTING**

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.
  - 1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

**3.6 CLEANING**

- A. Clean interior finish carpentry on exposed and semi-exposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

**3.7 PROTECTION**

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged and mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

**END OF SECTION 06 2023**



**SECTION 06 4116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. Section Includes:

- 1. Plastic-laminate-faced architectural cabinets and shelves.
- 2. Cabinet hardware.

B. Related Requirements:

- 1. Section 06 1000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
- 2. Section 12 3661 "Simulated Stone Countertops" for solid surface material and quartz countertops.

**1.3 PRE-INSTALLATION MEETINGS**

- A. Pre-installation Conference: Conduct conference at Project site.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product, including high-pressure decorative laminate and cabinet hardware and accessories.

- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, sections, large-scale details, attachment devices, and other components.

- 1. Show details full size.
- 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- 3. Show locations and sizes of cutouts and holes for items installed in architectural plastic-laminate cabinets.

C. Samples for Verification:

- 1. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each color, pattern, and surface finish.
- 2. Thermoset decorative panels, 8 by 10 inches (200 by 250 mm), for each color, pattern, and surface finish.
- 3. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications:

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

**PART 2 - PRODUCTS**

**2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS**

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
- B. Grade: Premium.
- C. Type of Construction: Frameless.
- D. Cabinet, Door and Drawer Front Interface Style: Flush overlay.
- E. Reveal Dimension: 1/4 inch (13 mm).
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
  - 1. Manufacturers: Subject to compliance with requirements, provide the products by one of the following:
    - a. Formica Corporation.
    - b. Phanolam/Pionite.
    - c. Egger
- G. Laminate Cladding for Exposed Surfaces:
  - 1. Horizontal Surfaces: Grade HGS.
  - 2. Postformed Surfaces: Grade HGP.
  - 3. Vertical Surfaces: Grade HGS.
  - 4. Edge Banding: 3mm PVC. Provide matching laminate edges where indicated.
  - 5. Pattern Direction: Vertically for drawer fronts, doors and fixed panels.
- H. Materials for Semi-exposed Surfaces:
  - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
    - a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
    - b. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
  - 2. Drawer Sides and Backs: Thermoset decorative panels with PVC edge banding.
  - 3. Drawer Bottoms: Thermoset decorative panels.
- I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
  - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

- K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

- 1. As selected by the Architect from manufacturer's full range.

## 2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

- 1. Wood Moisture Content: 5 to 10 percent.

- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

- 1. Hardboard: AHA A135.4.
  - 2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
  - 3. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

## 2.3 CABINET HARDWARE AND ACCESSORIES

- A. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening, self-closing.

- B. Wire Pulls: Back mounted, solid metal, Mockett DP7C Satin Nickel.

- C. Catches: Magnetic catches, BHMA A156.9, B03141.

- D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04102; with shelf brackets, B04112.

- 1. Basis of Design: Rakks Style BR2-14 with retaining pin.
  - 2. Surface-mounted C-Standards SC.
  - 3. Color: Clear anodized.

- E. Shelf Rests: BHMA A156.9, B04013; metal.

- F. Drawer Slides: BHMA A156.9, B05091.

- 1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted, full-overtravel-extension type, zinc-plated steel ball-bearing slides.

- G. Door Locks: ANSI/BHMA A156.11, E07121.

- H. Drawer Locks: ANSI/BHMA A156.11, E07041.

- I. Grommets for Cable Passage through Countertops: Round metal, with cover.

- 1. Basis of Design: BRV-1 2-3/8" diameter desk grommet, as manufactured by Mockett or equal.

2. Size: 2-11/16" overall diameter, for 2-3/8" diameter hole.
3. Color: Satin nickel.
4. Locations: As indicated on the drawings and to be coordinated with the Owner prior to drilling holes.

J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish as selected by the Architect.

1. Satin Stainless Steel: ANSI/BHMA 630.

K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

## 2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesives: Do not use adhesives that contain urea formaldehyde.

D. Adhesive for Bonding Plastic Laminate: Contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive.

## 2.5 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

**3.2 INSTALLATION**

- A. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- B. Install cabinets level, plumb, true and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
  - 1. Use filler matching finish of items being installed.
- E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
  - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

**3.3 ADJUSTING AND CLEANING**

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semi-exposed surfaces.

**END OF SECTION 06 4116**

**SECTION 07 2100 - THERMAL INSULATION**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Glass-fiber blanket insulation.
  - 2. Vapor retarders.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

**PART 2 - PRODUCTS**

2.1 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CertainTeed Corporation.
  - 2. Johns Manville.
  - 3. Owens Corning.
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

**2.2 VAPOR RETARDERS**

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils (0.15 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).
- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
- D. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
- E. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

**3.2 INSTALLATION, GENERAL**

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry and unsoiled and that has not been left exposed to ice, rain or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

**3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION**

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:



1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

#### **3.4 INSTALLATION OF VAPOR RETARDERS**

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
  1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (406 mm) o.c.
  2. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
- C. Seal joints caused by pipes, conduits, electrical boxes and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

#### **3.5 PROTECTION**

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

**END OF SECTION 07 2100**



**SECTION 07 8413 - PENETRATION FIRESTOPPING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Penetrations in fire-resistance-rated walls.
  - 2. Penetrations in horizontal assemblies.
  - 3. Penetrations in smoke barriers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
  - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
    - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
    - b. Classification markings on penetration firestopping correspond to designations listed by the following:
      - 1) UL in its "Fire Resistance Directory."

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Grace Construction Products.
  - 2. Hilti, Inc.
  - 3. 3M Fire Protection Products.

2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
  - 1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls and fire partitions.
  - 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.
- D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
  1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-wool-fiber or rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Fire-rated form board.
    - d. Fillers for sealants.
  2. Temporary forming materials.
  3. Substrate primers.
  4. Collars.
  5. Steel sleeves.

### 2.3 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
  1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
  3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

### 3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Designation of applicable testing and inspecting agency.
  4. Date of installation.
  5. Manufacturer's name.
  6. Installer's name.

**3.5 FIELD QUALITY CONTROL**

- A. As required, Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing or construction activities, repair or replace penetration firestopping to comply with requirements.
- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

**3.6 CLEANING AND PROTECTION**

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

**END OF SECTION 07 8413**





**SECTION 07 9200 - JOINT SEALANTS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Silicone joint sealants.
  - 2. Acoustical joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.5 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
  - 1. Products: Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Corning Corporation.
    - b. Pecora Corporation.
    - c. Tremco Incorporated.

2.3 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834. This product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Corning Corporation.
    - b. Pecora Corporation.
    - c. USG Corporation.

**2.4 JOINT SEALANT BACKING**

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

**2.5 MISCELLANEOUS MATERIALS**

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Remove laitance and form-release agents from concrete.
  - 3. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

- a. Metal.
  - b. Glass.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.
- 3.3 INSTALLATION OF JOINT SEALANTS
- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
- 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
- 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
    - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.
1. All normally occupied room shall have a minimum STC 45.
  2. Other rooms including but not limited to Triage, Offices, Exam, etc. shall have minimum STC per code and Guidelines for Design and Construction of Health Care Facilities (FGI).

### 3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### 3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
    - a. Vertical joints on exposed surfaces of walls and partitions.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - c. Other joints as indicated.
  2. Joint Sealant: Silicone.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Sealant Location:
    - a. Joints between plumbing fixtures and adjoining walls, floors and counters.
    - b. Other joints as indicated.
  2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

**END OF SECTION 07 9200**



**SECTION 08 1123 - HOLLOW METAL FRAMES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes:
  - 1. New hollow-metal door frames.
  - 2. Interior window and borrowed light frames.
- B. Related Requirements:
  - 1. Section 08 1416 "Flush Wood Doors" for doors to be installed in hollow metal frames.
  - 2. Section 08 7100 "Door Hardware" for door hardware for wood doors.
  - 3. Section 08 8000 "Glazing" for tempered glass to be installed in doors and in interior window framing.
  - 4. Section 09 9100 "Interior Painting" for finishing hollow metal door frames.

**1.3 DEFINITIONS**

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

**1.4 COORDINATION**

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

**1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings and finishes.
- B. Shop Drawings: Include the following:
  - 1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  - 2. Locations of reinforcement and preparations for hardware.
  - 3. Details of each different wall opening condition.
  - 4. Details of anchorages, joints, field splices, and connections.

5. Details of accessories.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A. Basis of Design: Hollow metal frames are based on Custom Profile 275 as manufactured by Curries Company; an Assa Abloy Group Company. Subject to compliance with requirements provide the named product or comparable product by one of the following:
  1. Republic Doors and Frames.
  2. Steelcraft; an Ingersoll-Rand Company.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

### 2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

### 2.3 INTERIOR HOLLOW METAL FRAMES

- A. Construct interior door and window frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances and clearances and as specified.
- B. Heavy-Duty Frames: SDI A250.8, Level 2.
  1. Physical Performance: Level B according to SDI A250.4.
  2. Frames:
    - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
    - b. Construction: Full profile welded.
  3. Exposed Finish: Prime.



**2.4 INTERIOR WINDOW AND BORROWED LIGHT FRAMES**

- A. Fabricate of metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm).
- B. Construction: Full profile welded.
- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

**2.5 FRAME ANCHORS**

- A. Jamb Anchors:
  - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
  - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

**2.6 MATERIALS**

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

**2.7 FABRICATION**

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
  
- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
  - 1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
  - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
  - 4. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
      - 1) Three anchors per jamb up to 60 inches (1524 mm) high.
      - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      - 3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
      - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
    - b. Compression Type: Not less than two anchors in each frame.
    - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
  - 5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
  
- C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
  
- D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
  - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
  - 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
  
- E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
  - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.

2. Provide fixed frame moldings on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

## 2.8 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
  1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

### 3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
  1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.

- c. Install door silencers in frames before grouting.
  - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
  - e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  - f. Field apply bituminous coating to backs of frames that will be filled with grout containing anti-freezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
- a. Floor anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. In-Place Metal-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
- a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
  - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

#### 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

**END OF SECTION 08 1123**

**SECTION 08 1416 - FLUSH WOOD DOORS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Five-ply flush wood veneer-faced solid-core doors for transparent finish.
2. Factory finishing flush wood doors to match existing.
3. Factory fitting flush wood doors to frames and factory machining for hardware.
4. Glass for door lights.

**B. Related Requirements:**

1. Section 08 1123 "Hollow Metal Door Frames" for frames to receive flush wood doors.
2. Section 08 8000 "Glazing" for glass full glass and view panels in flush wood doors.

**1.2 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference:** Conduct conference at Project site.

**1.3 ACTION SUBMITTALS**

**A. Product Data:** For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door trim for openings.
5. Factory-finishing specifications.

**B. Shop Drawings:** Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Dimensions and locations of blocking for hardware attachment.
4. Dimensions and locations of mortises and holes for hardware.
5. Clearances and undercuts.
6. Apply AWI Quality Certification Program label to Shop Drawings.

**C. Samples for Verification:**

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish.

1.4 CLOSEOUT SUBMITTALS

- A. Special warranties.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

- A. Environmental Limitations:
  - 1. Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Delamination of veneer.
    - b. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
    - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
  - 2. Warranty also includes installation and finishing that may be required due to repair or replacement of defective doors.
  - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Manufacturers: Basis of Design: doors are based on Aspiro Series, manufactured by Forte Openings (Formerly Masonite Architectural). Subject to compliance with requirements, provide the named product or comparable product by one of the following:
  - 1. Mohawk Flush Doors, Inc.; Forte Openings (Formerly Masonite Architectural)
  - 2. VT Industries Inc.

**2.2 FLUSH WOOD DOORS, GENERAL**

- A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."
1. Provide certificates from AWI certification program indicating that doors comply with requirements of grades specified.

**2.3 SOLID-CORE FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH**

A. Interior Doors, Solid-Core Five-Ply Veneer-Faced:

1. Performance Grade: ANSI/WDMA I.S. 1A Heavy Duty.
  2. Grade: Premium.
  3. Faces: Single-plywood veneer not less than 1/50 inch (0.508 mm) thick.
    - a. Species: Select white birch.
    - b. Cut: Plain sliced.
    - c. Match between Veneer Leaves: Book match.
    - d. Assembly of Veneer Leaves on Door Faces: Balance match.
    - e. Pair and Set Match: Provide for doors hung in same opening.
    - f. Room Match:
      - 1) Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet (3 m) or more.
  4. Exposed Vertical Edges: Same species as faces.
  5. Core for Non-Fire-Rated Doors:
    - a. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
  6. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.
- B. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.
1. Wood Species: Species compatible with door faces.
  2. Profile: Manufacturer's standard.

**2.4 GLASS FOR DOOR LIGHTS**

- A. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
  2. Thickness: 1/4-inch (6 mm).

**2.5 FABRICATION**

- A. Factory fit doors to suit frame-opening sizes indicated.
  - 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Factory machine doors for hardware that is not surface applied.
  - 1. Locate hardware to comply with DHI-WDHS-3.
  - 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
  - 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
- C. Openings: Factory cut and trim openings through doors.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 8000 "Glazing."
  - 3. Louvers: Factory install louvers in prepared openings.

**2.6 FACTORY FINISHING**

- A. Comply with referenced quality standard for factory finishing.
  - 1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 2. Finish faces, all four edges, edges of cutouts, and mortises.
  - 3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
  - 1. Grade: Premium.
  - 2. ANSI/WDMA I.S. 1A TR-6 Catalyzed Polyurethane.
  - 3. Staining and Sheen: Basis of Design is Forte Openings (Formerly Masonite Architectural) Aspiro Series in stain color Bourbon.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
  - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.



**3.2 INSTALLATION**

- A. Hardware: For installation, see Section 08 7100 "Door Hardware."
- B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Install frames level, plumb, true and straight.
  - 1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3.2 mm in 2400 mm).
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

**3.3 FIELD QUALITY CONTROL**

- A. Inspections:
  - 1. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

**3.4 ADJUSTING**

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

**END OF SECTION 08 1416**



**SECTION 08 3113 - ACCESS DOORS AND FRAMES**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes:
  - 1. Access doors and frames.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches (150 by 150 mm) in size.

1.3 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies meets the qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
  - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAl) certification.

**PART 2 - PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 FIRE-RATED ACCESS DOORS AND FRAMES

- A. Fire-Rated, Flush Access Doors with Exposed Flanges:
  - 1. Description: Door face flush with frame, uninsulated; with exposed flange, self-closing door, and concealed hinge.
  - 2. Locations: Wall and ceiling.
  - 3. Door Size: As indicated on the Drawings.
  - 4. Fire-Resistance Rating: Not less than that of adjacent construction.
  - 5. Temperature-Rise Rating: 450 deg F (250 deg C) at the end of 30 minutes.

6. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch (1.02 mm), 20 gage, factory primed.
7. Frame Material: Same material, thickness, and finish as door.
8. Latch and Lock: Self-latching door hardware, operated by key with interior release.

B. Non Fire-Rated, Flush Access Doors with Exposed Flanges:

1. Description: Door face flush with frame, uninsulated; with exposed flange, and concealed continuous hinge.
2. Locations: Wall.
3. Door Size: G.C. to field verify size needed.
4. Fire-Resistance Rating: Not less than that of adjacent construction.
5. Temperature-Rise Rating: 450 deg F (250 deg C) at the end of 30 minutes.
6. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch (1.02 mm), 20 gauge, factory primed.
7. Frame Material: Same material, thickness, and finish as door.
8. Latch and Lock: Stainless steel screwdriver operated cam latch.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- D. Frame Anchors: Same material as door face.
- E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
  1. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded to perimeter of frames.
- D. Latch and Lock Hardware:
  1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
  2. Keys: Furnish two keys per lock and key all locks alike.

2.5 FINISHES

- A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

**END OF SECTION 08 3113**



**SECTION 08 7100 – DOOR HARDWARE**

**PART 1 – GENERAL**

1.01 SUMMARY

- A. Section includes hardware for doors specified in “Hardware Sets”.
- B. Related Divisions:
  - 1. Division 03 Concrete
  - 2. Division 06 Rough & Finish Carpentry
  - 3. Division 07 Joint Sealants
  - 4. Division 08 Openings
  - 5. Division 09 Finishes
  - 6. Division 10 Specialties
  - 7. Division 13 Special Construction
  - 8. Division 26 Electrical
  - 9. Division 28 Electronic Safety and Security

1.02 REFERENCES

- A. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI):
  - 1. ANSI/BHMA A156.1 Butts & Hinges (2016)
  - 2. ANSI/BHMA A156.3 Exit Devices (2020)
  - 3. ANSI/BHMA A156.4 Door Controls – Closers (2019)
  - 4. ANSI/BHMA A156.5 Cylinders and Input Devices for Locks (2020)
  - 5. ANSI/BHMA A156.6 Architectural Door Trim (2015)
  - 6. ANSI/BHMA A156.7 Template Hinge Dimensions (2016)
  - 7. ANSI/BHMA A156.8 Door Controls – Overhead Stops and Holders (2015)
  - 8. ANSI/BHMA A156.13 Mortise Locks & Latches (2017)
  - 9. ANSI/BHMA A156.18 Materials & Finishes (2020)
  - 10. ANSI/BHMA A156.22 Door Gasketing Systems (2017)
  - 11. ANSI/BHMA A156.25 Electrified Locks (2018)
  - 12. ANSI/BHMA A156.28 Keying Systems (2018)
  - 13. ANSI/BHMA A156.35 Power Supplies for Electronic Access Control (2020)
- B. International Code Council/American National Standards Institute (ICC/ANSI)/ADA:
  - 1. ICC/ANSI A117.1 Standards for Accessible and Usable Buildings and Facilities.
- C. Door and Hardware Institute (DHI):
  - 1. DHI Publication – Abbreviations and Symbols (2019).
  - 2. DHI Publication – Installation Guide for Doors and Hardware (2020).
  - 3. DHI Publication – Sequence and Format of Hardware Schedule (2019).
- D. National Fire Protection Agency (NFPA):
  - 1. NFPA 70 National Electrical Code.
  - 2. NFPA 80 Standard for Fire Doors and Other Opening Protectives.
  - 3. NFPA 105 Standard for the Installation of Smoke Door Assemblies.

1.03 SUBMITTALS

- A. Submit in accordance with Conditions of the Contract and Division 01 Administrative Requirements and Submittal Procedures Section.

- B. Shop Drawings:
1. Schedule hardware in vertical format using the DHI publication Sequence and Formatting for the Hardware Schedule.
  2. Include abbreviations and symbols page to include manufacturers' abbreviations, finish code descriptions, and fastener abbreviations including descriptions according to the DHI publication Abbreviations and Symbols.
  3. Detail headings referencing the Architect's heading, opening number, locations, fire rating, handing, degree of opening, and description of the opening elements. Include Voltage, amperage, and operational descriptions for openings that have electrified hardware.
  4. Coordinate final door hardware schedule with doors, frames, and related work listing proper sizing of hardware, addressing door thickness, handing, function, mounting accessories, and finish of hardware.
  5. List related door devices specified in other Sections for each opening.
  6. Architectural Hardware Consultant (AHC), as certified by DHI, who will affix seal attesting to completeness and correctness, including the review of the hardware schedule prior to submittal.
- C. Product Data:
1. Furnish manufacturers' catalog sheets on design, grade, and function of items listed in hardware schedule. Submit only relevant information and circle or highlight the technical information including: model numbers, sizing information, voltage and amperage requirements, options and accessories required, means of fastening, listings of fire-rated applications, and finishes.
- E. Templates:
1. Within fourteen days of receiving approved door hardware submittals submit complete list of templates for each hardware item to the opening manufacturers and the installers. Include detailed lists of the hardware location requirements for mortised and surface applied hardware.
- F. Wiring Diagrams: Detail a title block for each drawing that includes the project name, project address, architect name, architect's opening number, hardware set, date, and name of the author.
1. Elevation Riser Drawings:
    - a. Furnish one set of elevation drawings with each hardware schedule submittal for hardware sets that contain electrified hardware. Illustrate the openings with proportional representations of the opening and electrified hardware components and dimension their mounting locations as well as sizes of junction boxes and power supplies. Label the components, wire quantities and gauges, high voltage requirements, as well as other building interfaces. Create a legend that complements the drawings with brand names, model numbers, and include voltage and amperage requirements. Add an operational description that includes the normal state of the door, ingress, egress, and what happens in case of power loss or fire alarm activation and any special conditions.
    - b. Upon receipt of approved hardware correct and resubmit elevation drawings with the point-to-point and system drawings.
  2. Point-to-Point and System Drawings: Upon receipt of approved hardware schedule, submit point-to-point per hardware set and a system drawing. Cross-reference all wiring diagrams and the associated drawings to each other.
    - a. Point-to-Point Drawings: Draw each product in a realistic representation including each terminal including those not used, and lines representing wires from component to component, labeling wire colors and gauges.
    - b. System Drawing: illustrate all equipment and building interfaces required for the entire system. Include room labels and locations, opening numbers and locations.



- G. Closeout Submittals: Include the following information as well as highlight and flag fire rated openings for annual inspections:
  - 1. Cover page with required information:
    - a. Project name
    - b. Hardware supplier's name and contact information.
    - c. Date of substantial completion.
  - 2. Final record hardware schedule.
  - 3. Product Data.
  - 4. Keying Schedule.
  
  - 5. Record Wiring Diagrams.
    - a. System Drawing.
    - b. Elevations.
    - c. Point-to-Point Drawings with all final wire colors noted as terminated. (Include network IP and/or MAC addresses of field devices).
  - 6. Operating and Maintenance Manual.
  - 7. Warranty Information.

**1.04 QUALITY ASSURANCE**

- A. Hardware supplier shall employ an Architectural Hardware Consultant (AHC) as certified by DHI and a member of the seal program who will be available at reasonable times during course of work for Project hardware consultation.
  - 1. Electrified Door Hardware Supplier Qualifications: Experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that is indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
  - 2. Access and Electrified Security Supplier Qualifications: Experienced supplier who has completed projects with access and electrified security door hardware similar in material, design, and extent to that is indicated for this Project, whose work has resulted in construction with a record of successful in-service performance and be a factory authorized distributor.
  
- B. Where openings are required to be accessible door hardware shall conform to ICC/ANSI A117.1.
  
- C. Fire Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware complying with NFPA 80 that are listed and/or labeled by a qualified testing agency for fire-protection ratings indicated.
  
- D. Smoke and Draft Control Door Assemblies: Where smoke and draft control doors are required, provide door hardware that meets requirements of assemblies in compliance with NFPA 105.
  
- E. Door hardware certified to ANSI/BHMA standards as noted, manufacturer must participate and be listed in BHMA Certified Products Directory.
  
- F. Substitution requests shall be submitted in compliance with Division 01: create a comparison chart that includes the testing information as well as the warranty for both the specified product and the proposed substitution. Include the reason for requesting the substitution, clear catalog copy highlighting the proposed product and options, compliance statement, technical data, product warranty and lead time, to show how the proposed can meet or exceed established level of design, function, and quality.
  - 1. Items listed with no substitute manufacturers have been requested by the Owner to meet existing standard and will not be reviewed for substitution unless the product is no longer available.

- G. Meetings: Comply with requirements in Division 01 Section "Project Meetings."
1. Low-voltage Coordination Meeting
    - a. Prior to furnishing door hardware submittals, convene a low-voltage coordination meeting. Meeting participants should include all affected trades including the following, but not limited to: Contractor, installer, supplier, electrical contractor, security consultant and installer, Owner's IT representative, and fire alarm consultant.
    - b. Review sequence of operation for each opening with electrified hardware to ensure that every opening functions properly for the Owner's use.
    - c. Discuss the types of electrified door hardware, inspection, and electrical roughing-in and other preparatory work performed by other trades.
    - d. Verify wire quantities, wire types, wire sizes, conduit sizes, and locations including if the power supplies will be centrally located or if they will be located near each opening.
    - e. Coordinate the door hardware, power supplies, back-up power requirements, access control components, fire alarm interfaces, elevator controls, and related building systems have all proper and necessary components to interface and operate correctly.
  2. Keying Meeting
    - a. Within fourteen days of receiving approved door hardware submittals, contact Owner to establish a keying conference. Include keying meeting decisions into final keying schedule submittal after reviewing the following, but not limited to:
      - ii. Function of the building, flow of traffic, individual area's purpose, and degree of security.
      - iii. Lock functions and operation.
      - iv. Preliminary key system schematic diagram.
      - v. Verify existing keyway(s), and/or proposed keyway(s)
      - vi. Visual key and cylinder identification
      - vii. Quantity of keys required including master level keys, change keys, and keys per lock.
      - viii. Review the key control system.
      - ix. Determine the recipient and contact information for the delivery of keys and accessories.
  3. Pre-installation Meeting
    - a. Convene meeting within fourteen days of receiving approved door hardware submittals. Participants from all affected buildings trades shall attend. Minimum participants should include: Contractor, installer, material supplier, manufacturer representatives, electrical contractor, security consultant, and fire alarm consultant.
    - b. Inspect and discuss preparatory work performed by other trades.
    - c. Include in-conference decisions regarding proper installation methods and procedures for receiving and handling hardware.
    - d. Review all system, elevation, and point-to-point drawings to ensure that all necessary components are provided and detailed.
    - e. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - f. Review required testing, inspecting, and certifying procedures.
- H. Installer Qualifications: Specialized in performing installation of this Section and have five years minimum documented experience.
1. Electrified Hardware Supplier Qualifications: Experienced door hardware installer who has installed projects with electrified door hardware 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.
  2. Access Control and Electrified Security Supplier Qualifications: Experienced installer who has completed projects with access and electrified security door hardware 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 and be a factory authorized to install and commission the system.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Pack each item complete with necessary parts and fasteners in manufacturer's original packaging.
- B. Mark hardware that is not bulk packed with architect's opening number, hardware set number, and item number for each type of hardware. Include keyset symbols and corresponding hardware component for keyed products. Mark hardware that is bulk packed with manufacturers' part number and reference all hardware sets associated.
- C. Deliver hardware to the job site according to the phasing agreed upon in the pre-installation meeting. Inventory the delivery with the supplier's assistance. Immediately note shortages and damages on the shipping receipts and bill of lading. Coordinate replacement or repair with the supplier.
- D. Deliver permanent keys, cores, access control credentials, software, and related accessories directly to Owner via registered mail or overnight package service. Establish the instructions for delivery to Owner at "Keying Conference."
- E. Provide a clean, dry, and secure room for hardware delivered. Shelve hardware off the floor and with larger items of hardware stored on pallets. Arrange locksets and keyed cylinders by opening number. Organize the balance of hardware by brand, model of hardware, and hardware set number. Leave the door markings of the hardware visible for installers.
- F. Waste Management and Disposal: Separate waste materials for use or recycling in accordance with Division 01.

**1.06 WARRANTY**

- A. General Warranty: Comply Division 01 for Warranty requirements.
- B. Special Warranty: Warranties specified in this article will not deprive Owner of other rights.
  - 1. Ten years for manual door closers.
  - 2. Five years for locks.
  - 3. Five years for exit devices.
  - 4. One year for electromechanical door hardware.
  - 5. All access and electrified security equipment and systems will be warranted for a period of one (1) year commencing with the filing date of the Notice of Completion, provided the system has been inspected and signed off by a factory authorized installer and the factory authorized commissioning agent.

**1.07 MAINTENANCE**

- A. Maintenance Tool and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, removal, and replacement of door hardware.

**PART 2 – PRODUCTS**

**2.01 HINGES**

- A. Hinges, electric hinges, and self-closing hinges of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Standards: Products to be certified and listed by the following:

1. Butts and Hinges: ANSI/BHMA A156.1.
2. Template Hinge Dimensions: ANSI/BHMA A156.7.
3. Self-Closing Hinges: ANSI/BHMA A156.17.

**C. Butt Hinges:**

1. Hinge weight and size unless otherwise indicated in hardware sets:
  - a. Doors up to 36" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .134" and a minimum of 4-1/2" in height.
  - b. Doors from 36" wide up to 42" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .145" and a minimum of 4-1/2" in height.
  - c. For doors from 42" wide up to 48" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .180" and a minimum of 5" in height.
  - d. Doors greater than 1-3/4" thick provide hinges with a minimum thickness of .180" and a minimum of 5" in height.
  - e. Width of hinge is to be minimum required to clear surrounding trim.
2. Base material unless otherwise indicated in hardware sets:
  - a. Exterior Doors: 304 Stainless Steel, Brass or Bronze material.
  - b. Interior Doors: Steel material.
  - c. Fire Rated Doors: Steel or 304 Stainless Steel materials.
  - d. Stainless Steel ball bearing hinges to have stainless steel ball bearings. Steel ball bearings are unacceptable.
3. Quantity of hinges per door unless otherwise stated in hardware sets:
  - a. Doors up to 60" in height provide 2 hinges.
  - b. Doors 60" up to 90" in height provide 3 hinges.
  - c. Doors 90" up to 120" in height provide 4 hinges.
  - d. Doors over 120" in height add 1 additional hinge per each additional 30" in height.
  - e. Dutch doors provide 4 hinges.
4. Hinge design and options unless otherwise indicated in hardware sets:
  - a. Hinges are to be of a square corner five-knuckle design, flat button tips and have ball bearings unless otherwise indicated in hardware sets.
  - b. Out-swinging exterior and out-swinging access-controlled doors are required to have Non-Removable Pins (NRP) to prevent removal of pin while door is in closed position.
  - c. When full width of opening is required, use hinges that are designed to swing door completely from opening when door is opened to 95 degrees.
  - d. Electric Through-Wire (ETW) to have appropriate number of wires to transfer power through door frame to door for proper connection of finish hardware and certified to handle an amperage rating of 3.5AMPS/continuous duty with 16.0AMPS/intermittent duty.
  - e. Provide mortar boxes for frames that require any electrically modified hinges if not an integral part of frame.
  - f. When shims are necessary to correct frame or door irregularities, provide metal shims only.

**5. Acceptable Manufacturers:**

	Standard Weight	Heavy Weight
Hager – Basis of Design	BB1279/BB1191	BB1168/BB1199
Ives		
McKinney		
Markar		

**2.02 LOCKS AND LATCHES**

- A. Locks and latches of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Standards: Product to be certified and listed by following:
  1. ANSI/BHMA A156.13 Series 1000 Certified to Grade 1 for Operational and Security.
  2. UL/cUL Labeled and listed up to 3 hours for single doors up to 48" in width and up to 96" in height.
  3. UL10C/UBC 7-2 Positive Pressure Rated.
  4. ICC/ANSI A117.1.
- C. Lock and latch function numbers and descriptions of manufacturer's series as listed in hardware sets.
- D. Material and Design:
  1. Lock cases from fully wrapped, 12-gauge steel, zinc dichromate for corrosion resistance.
  2. Non-handed, field reversible without opening lock case.
  3. Break-away spindles to prevent unlocking during forced entry or vandalism.
  4. Levers, zinc cast, forged brass or stainless steel and plated to match finish designation in hardware sets.
  5. Sectional Roses, solid brass or stainless-steel material and have a minimum diameter of 2-7/16".
  6. Armor fronts, self-adjusting to accommodate a square edge door or a standard 1/8" beveled edge door.
- E. Latch and Strike:
  1. Stainless steel latch bolt with minimum of 3/4" throw and deadlocking for keyed and exterior functions.
  2. Strike is to fit a standard ANSI A115 prep measuring 1-1/4" x 4-7/8" with proper lip length to protect surrounding trim.
  3. Deadbolts to be 1-3/4" total length with a minimum of a 1" throw and 3/4" internal engagement when fully extended and made of stainless-steel material.
- F. Electrified Locks
  1. Fail-Safe (power lock): Outside trim is locked when power is applied and unlocked when power is removed. Lockset will unlock in the event of a power failure (EL).
  2. Fail-Secure (power unlock): Outside trim is locked when there is no power and unlocked when power is applied. Lockset will be locked in the event of a power failure (EU).
  3. Request to Exit: Monitors inside lever rotation (RX).

G. Acceptable Manufacturers:

Schlage – Basis of Design	L9000 Series
Accentra	
Corbin-Russwin	
Sargent	

2.03 PUSHBUTTON LOCK

- A. Pushbutton locks of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Standards: Product to be listed by following UL/cUL labeled and listed for functions up to 3 hours for single doors up to 48" in width and up 96" in height.
- C. Lock and latch function numbers and descriptions of manufacturer's series as listed in hardware sets.

- D. Material and Design:
  1. Support 500 PIN codes, multi-level user code, and one-time service codes. Provide free passage, group, and total lock-out modes.
  2. Provide metal keypad with key override.

E. Acceptable Manufacturers:

Schlage	CO-200-MS Series
Alarm Lock	
Sargent	
Accentra	

2.04 EXIT DEVICES

- A. Exit Devices of one manufacturer as listed for continuity of design and consideration of warranty. Touchpad type, finish to match balance of door hardware.
- B. Standards: Manufacturer to be certified and/or listed by the following:
  1. BHMA Certified ANSI A156.3 Grade 1.
  2. UL/cUL Listed for up to 3 hours for "A" labeled doors.
  3. UL10C/UBC 7-2 Positive Pressure Rated.
  4. UL10B Neutral Pressure Rated.
  5. UL 305 Listed for Panic Hardware.
- C. Material and Design:
  1. Provide exit devices with actuators that extend a minimum of one-half of door width.
  2. Where trim is indicated in hardware sets provide the lever design to match design of lock levers.
  3. Exit device to mount flush with door.
  4. Latchbolts:
    - a. Rim device – 3/4" throw, Pullman type with automatic dead-latching, stainless steel
    - b. Surface vertical rod device – Top 1/2" throw, Pullman type with automatic dead-latching, stainless steel. Bottom 1/2" throw, Pullman type, held retracted during door swing, stainless steel.
  5. Fasteners: Wood screws, machine screws, and thru-bolts.
- D. Lock and Latch Functions: Function numbers and descriptions of manufacturer's series and lever styles indicated in door hardware sets.
- E. Electric Modifications:
  1. Provide Request to Exit (REX) switches as scheduled.
  2. Electrified Trim: Outside trim locked (EL) or unlocked (EU) by electric current.

F. Acceptable Manufactures:

Sargent – Basis of Design	80 Series
Von Duprin	
Accentra	

2.05 CYLINDERS AND KEYING

- A. Cylinders of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Products to be certified and listed by the following:
  1. Auxiliary Locks: ANSI/BHMA A156.5
- C. Cylinders:

1. Provide cylinders matched to the types required for hardware that has a locking function and for keyed electronic functions. Furnish with appropriate collars, cams, and tailpieces to fit and operate associated hardware. Stacking collars is not acceptable, a single collar of proper size is required.
2. Manufacturer's standard tumbler type, seven-pin IC core and seven-pin conventional core supported by the Hager H series keyway.
3. Manufacturer's standard tumbler type six-pin conventional cylinder.
4. Manufacturer's six-pin seven-pin small format interchangeable core (SFIC).
5. Provide concealed key control (CKC) at cylinder by stamping or permanently marking the keyset symbol in a location on the cylinder that is concealed when installed.

**D. Keying:**

1. Key into Owner's existing key system.
2. Provide cylinders as required to meet building standard keyway.
3. Provide a bitting list to Owner of combinations as established, and expand to twenty-five percent for future use or as directed by Owner.
  - a. Include all of the keysets and bittings of the original key system creating one clean version of the entire key system.
4. Keys to be shipped directly to the Owner's Representative as established during the keying conference.
  - a. Package the keys in individual envelopes, grouped by keyset symbol, and label envelopes with project name, factory registry number, and keyset symbol.
5. Stamp large bow key blanks with visual key control (keyset symbol) and "Do Not Duplicate".
6. Provide interchangeable cores with construction cores as required per the keying meeting.
7. Provide construction keyed cylinders as required per the keying meeting.

**E. Acceptable Manufacturers:**

Corbin – Russwin – Basis of Design
Accentra
Medeco
Sargent

**2.06 PUSH/PULL PLATES AND BARS**

- A. Push/Pull plates and bars of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Standards: Manufacturer to be certified by the following:
  1. Architectural Door Trim: ANSI/BHMA A156.6.
  2. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
- C. Push plates: .050" thick, square corner and beveled edges with countersunk screw holes. Width and height as stated in hardware sets.

**D. Acceptable Manufacturers:**

Hager – Basis of Design	30S
Rockwood	
Trimco	

- E. Pull Plates: .050" thick, square corner and beveled edges. Width and height as stated in hardware sets, 3/4" diameter pull, with clearance of 2-1/2" from face of door.

**F. Acceptable Manufacturers:**

Hager – Basis of Design	H33J
Rockwood	

Trimco	
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**2.07 CLOSERS**

- A. Closers of one manufacturer as listed for continuity of design and consideration of warranty. Unless otherwise indicated on hardware schedule, comply with manufacturer’s recommendations for size of closer, depending on width of door, frequency of use, atmospheric pressure, ADAAG requirements, and fire rating.
  
- B. Standards: Manufacturer to be certified by the following:
  - 1. BHMA Certified ANSI A156.4 Grade 1.
  - 2. ADA Complaint ANSI A117.1.
  - 3. UL/cUL Listed up to 3 hours.
  - 4. UL10C Positive Pressure Rated.
  - 5. UL10B Neutral Pressure Rated.
  
- C. Material and Design:
  - 1. Provide aluminum non-handed bodies with full plastic covers.
  - 2. Closers will have separate staked adjustable valve screws for latch speed, sweep speed, and backcheck.
  - 3. Provide Tri-Pack arms and brackets for regular arm, top jamb, and parallel arm mounting.
  - 4. Double heat-treated steel, tempered springs.
  - 5. Precision machined heat-treated steel piston.
  - 6. Triple heat-treated steel spindle.
  - 7. Full rack and pinion operation.
  
- D. Mounting:
  - 1. Out-swing doors surface parallel arm mount closers except where noted on hardware schedule.
  - 2. In-swing doors surface regular arm mount closers except where noted on hardware schedule.
  - 3. Provide brackets and shoe supports for aluminum doors and frames to mount fifth screw.
  - 4. Furnish drop plates where top rail conditions on door do not allow for mounting of closer and where backside of closer is exposed through glass.
  
- E. Size closers in compliance with requirements for accessibility (ADAAG). Comply with following maximum opening force requirements.
  - 1. Interior hinged openings: 5.0 lbs.
  - 2. Fire-rated and exterior openings are to be adjusted to have minimum opening force allowable by authority having jurisdiction.
  
- F. Fasteners: Provide self-reaming, self-tapping wood and machine screws, and sex nuts and bolts for each closer.

**G. Acceptable manufacturers:**

LCN – Basis of Design	4040XP Series
Norton	
Sargent	

**2.08 PROTECTIVE TRIM**

- A. Protective trim of one manufacturer as listed for continuity of design and consideration of warranty.
  
- B. Size of protection plate: single doors, size two inches less door width (LDW) on push side of door, and one inch less door width on pull side of door. For pairs of doors, size one inch less



door width (LDW) on push side of door, and 1/2 inch on pull side of door. Adjust sizes to accommodate accompanying hardware, such as, edge guards, astragals, and others.

1. Kick Plates 8" high or sized to door bottom rail height.
2. Mop Plates 4" high.

C. Products to be certified and listed by the following:

1. Architectural Door Trim: ANSI/BHMA A156.6.
2. UL.

D. Material and Design:

1. 0.050" gage stainless steel.
2. Corner's square, polishing lines, or dominant direction of surface pattern so they run across door width of plate.
3. Bevel top, bottom, and sides uniformly leaving no sharp edges.
4. Countersink holes for screws. Space screw holes so they are no more than eight inches CTC, along a centerline not over 1/2" in from edge around plate. End screws maximum of 0.53" from corners.

E. UL label stamp required on protection plates when top of plate is more than 16 inches above bottom of door on fire rated openings. Verify door manufacturer's UL listing for maximum height and width of protection plate to be used.

F. Acceptable Manufacturers:

Hager – Basis of Design	190S
Rockwood	
Trimco	

**2.09 STOPS AND HOLDERS**

A. Stops and holders of one manufacturer as listed for continuity of design and consideration of warranty.

B. Wall Stops: Provide door stops wherever necessary to prevent door or hardware from striking an adjacent partition or obstruction. Provide wall stops when possible. Door stops and holders mounted in concrete floor or masonry walls have stainless steel machine screws and lead expansion shields.

C. Products to be certified and listed by the following:

1. Auxiliary Hardware: ANSI/BHMA A156.16.

D. Acceptable Manufacturers:

	Convex	Concave
Hager – Basis of Design	232W	236W
Rockwood		
Trimco		

E. Overhead Stops and Holders: Provide overhead stops and holders for doors that open against equipment, casework sidelights and other objects that would make wall stops/holders and floor stops/holders inappropriate. Provide sex bolt attachments for mineral core wood door applications.

- F. Products to be certified and listed by the following:
  1. Overhead Stops and Holders: ANSI/BHMA A156.8 Grade 1.

G. Acceptable Manufacturers:

	Heavy Duty Surface	Heavy Duty Concealed
ABH – Basis of Design	4000 Series	4400 Series
Glynn Johnson	90 SRF Series	100 Series
Sargent	590 Series	690 Series

**2.10 DOOR GASKETING AND WEATHERSTRIP**

- A. Door gasketing and weatherstrip of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing where indicated on hardware schedule. Provide noncorrosive fasteners for exterior applications.
  1. Perimeter gasketing: Apply to head and jamb, forming seal between door and frame.
  2. Meeting stile gasketing: Fasten to meeting stiles, forming seal when doors are in closed position.
  3. Door bottoms: Apply to bottom of door, forming seal with threshold or floor when door is in closed position.
  4. Sound Gasketing: Cutting or notching for stop mounted hardware not permitted.
  5. Drip Guard: Apply to exterior face of frame header. Lip length to extend 4” beyond width of door.
- C. Products to be certified and listed by the following:
  1. Door Gasketing and Edge Seal Systems: ANSI/BHMA A156.22.
  2. BHMA certified for door sweeps, automatic door bottoms, and adhesive applied gasketing.
- D. Smoke-Labeled Gasketing: Comply with NFPA 105 listed, labeled, and acceptable to Authorities Having Jurisdiction, for smoke control indicated.
  1. Provide smoke-labeled gasketing on 20-minute rated doors and on smoke rated doors.
- E. Fire-Rated Gasketing: Comply with NFPA 80 listed, labeled, and acceptable to Authorities Having Jurisdiction, for fire ratings indicated.
- F. Refer to Section 08 1416 Wood Doors for Category A or Category B. Comply with UBC 7-2 and UL10C positive pressure where frame applied intumescent seals are required.

G. Acceptable Manufacturers:

- 1. Perimeter Gasketing:

	Adhesive Applied
Pemko – Basis of Design	S88
Reese	
Zero	
National Guard	

**2.11 SILENCERS**

- A. Where smoke, light, or weather seal are not required, provide three silencers per single door frame, two per double door frame and four per Dutch door frame.
- B. Products to be certified and listed by the following:

1. Auxiliary Hardware: ANSI/BHMA A156.16

C. Acceptable Manufacturers:

	Hollow Metal Frame
Hager	307D
Rockwood	
Trimco	

2.12 KEY CABINET

- A. Provide key cabinet; surface mounted to wall.
  
- B. Key control system:
  1. Include two sets of key tags, hooks, labels, and envelopes.
  2. Contain system in metal cabinet with baked enamel finish.
  3. Capacity will be able to hold actual quantities of keys, plus 50 percent.
  4. Provide tools, instruction sheets, and accessories required to complete installation.

C. Acceptable Manufacturers:

Lund Equipment
Telkee Incorporated
Key Control

2.13 FINISHES

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if within range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved samples.
  
- B. Comply with base material and finish requirements indicated by ANSI/BHMA A156.18 designations in hardware schedule.

**PART 3 – EXECUTION**

3.01 EXAMINATION

- A. Examine doors and frames, with installers present, for compliance with requirements for installation tolerances, labeled fire-rated construction, wall and floor construction, and other conditions affecting performance.
  
- B. Where hardware will be installed directly on walls inspect applications for blocking material of sufficient type and size for hardware.
  
- C. Examine roughing-in and cabling for electrical power systems to verify actual locations of wiring connections and wiring supplied matches the requirements as described in the wiring diagrams before electrified door hardware installation.
  
- D. Perform a site survey to determine proper mounting locations for all wirelessly communicating devices. Verify that the surrounding construction and equipment will not interfere with the communication between components.

- E. Where existing products will be reused, examine existing door and frame sizes, preps, swings, ratings, and compare to the specified hardware for compatibility and functionality. The hardware set specified should act as guide for design and function. Provide filler plates as needed to fill and repair existing materials. Test any existing to remain hardware for functionality and visually inspect for damage. Note any defective or damaged products as well as noting any code deficiencies and submit issues and estimated costs for direction of how to proceed with repair or replacement.
- F. Notify Architect via a prepared written report and endorsed by installer of any discrepancies between the door schedule, door types, drawings, and scheduled hardware. List conditions detrimental to application, to the proper and timely completion of the work and performance of the hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.02 INSTALLATION

- A. Install hardware using manufacturers' recommended fasteners and installation instructions, at height locations and clearance tolerances that comply with:
  - 1. NFPA 80
  - 2. NFPA 105
  - 3. ICC/ANSI A117.1
  - 4. DHI Publication – Installation Guide for Doors and Hardware
  - 5. Approved shop drawings
  - 6. Approved hardware schedule
- B. Install soffit mounted gaskets prior to other soffit mounted hardware ensuring a continuous seal around the perimeter of the opening without cutting or notching.
- C. Locate surface mounted door closers on stairwell side of stair doors, interior side of exterior openings, or on the room side of openings, unless it is a sterile room.
- D. Locate wall mounted bumper to contact the operating trim. Verify that pushbuttons of locksets do not contact the stop and inadvertently lock the door.
- E. Mount armor, mop, and kick plates flush with the bottom of the door and centered horizontally on the door.
- F. Notch thresholds with no larger than a 1/32-inch gap matching the frame profile. Set in a full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants" forming a tight seal between threshold and mounting surface. Caulk and seal the entire perimeter to prevent water leakage. Remove excess sealants immediately and clean the area thoroughly.
- G. Do not install surface mounted items until finishes have been completed on substrates involved. Set unit level, plumb and true to line location.
- H. Locate power supplies and junction boxes as directed and verified in the low-voltage coordination meeting.
- I. Perform final connections of the system components to match the approved operational narratives. Use cable markers to label wires at each termination or end to match the final wiring diagrams. Terminate wiring in accordance with the manufacturer's recommendations. Where quick-connects are seated correctly. Provide wire ties and adhesive pads to secure and organize wires in enclosures. Outside of enclosures seal terminations in waterproof connectors. Include record drawings of the point-point and the elevations in a plastic sleeve attached to the inside cover of the power supply/junction box enclosure for the Owner's use.

### 3.03 FIELD QUALITY CONTROL

- A. Schedule a final walk through to inspect hardware installation ten (10) business days before final acceptance of the Owner. Visually inspect for proper fasteners and verify that doors open, close, latch properly, and that openings are installed to meet NFPA 80 and ANSI A117.1 requirements. Correct deficiencies, including missing hardware immediately. Provide a written report detailing discrepancies of each opening within five (5) business days of the walk through.
- B. Prior to receiving certificate of occupancy have doors inspected by a Certified Fire and Egress Door Assembly Inspector (CFDAI), as certified by Intertek (ITS), submit a written report to the Owner and Contractor. Doors failing inspection must be adjusted, modified, or replaced to be within appropriate code requirements without delay.
- C. Test the functionality of electrified openings upon completion of the installation in accordance with the description of operation and the Owner's intent under the supervision of a factory authorized representative and an Owner's representative, verify that all features of the software are working correctly, including interfaces with any associated trades. Document the result of all tests and provide these results to the Owner and correct immediately.

#### 3.04 ADJUSTMENT, CLEANING, AND DEMONSTRATING

- A. Prior to final adjustments, the HVAC system must be completed and balanced. Test that all openings meet ANSI A117.1 for closer opening pressure, closing speed, latching, and hardware operating forces. Replace items that cannot be adjusted to operate freely and smoothly or as intended for application.
- B. Prior to final walk-through inspection, clean adjacent surfaces soiled by hardware installation. Clean finish hardware per manufacturer's instructions after final adjustments have been made. Remove all protection and replace items that cannot be cleaned to manufacturer's level of finish quality.
- C. Demonstration and training will be conducted as per the following sessions. All sessions will be recorded and turned over to the Owner for future use.
  - 1. Hardware Maintenance: Conduct a training class for building maintenance personnel demonstrating the adjustment, operation, and maintenance of mechanical and electrified hardware. Special tools for finish hardware to be turned over and demonstrated usage at the meeting.
  - 2. Key control system: Train the Owner's designated representative on the key control system demonstrating the permanent file keys, duplicate loaner keys, key receipts, key envelopes, key change identification sheets, bitting lists, tags, and labels. When key management software is provided training will be provided for the setup and usage of the software.
  - 3. Access control: Demonstrate the management and programming of the access control system including the following, but not limited to:
    - a. System administration personnel to manage the LAN and databases including updating, maintaining, and backing up the system and database software.
    - b. Instruct on all software features and programming for managing the credentials, users, access points, time zones, alarms and events, door monitoring, audit trails, and time schedules.

#### 3.05 PROTECTION

- A. Leave manufacturer's protective film intact and, protect exit devices, locks, and surface mounted hardware with kraft paper or bubble wrap. Cover fire labels at painted products that bear a label with magnetic or masking tape. Keep protection in place until time of final cleaning and adjustment.

#### 3.06 HARDWARE SET SCHEDULE

- A. Door hardware items have been placed in sets which are intended to be a guide of design, grade, quality, function, operation, and performance.
1. Review products that may require mounting accessories to meet door, frame, and swing conditions as these final details vary from manufacturer to manufacturer and provide as required.
  2. Where additional items of hardware are required for completion of the Work, a written statement of such omission, error, or other discrepancy is required to be submitted to the Architect, prior to bid date for clarification via an addendum.
  3. Abbreviations listed below do not appear in the manufacturer's literature, for any other abbreviations refer to manufacturer's literature.:
    - a. LDW = Less than Door Width
    - b. LAR = Length as Required
    - c. QTY = Quantity
    - d. CTC = Centerline to Centerline
    - e. BTB = Back-to-Back mounting

1.01 HARDWARE SCHEDULE

Hardware Sets

Set #01

Doors: 1200STA, 1400STB

3 Hinge(s)	BB1168 4 1/2" x 4 1/2"	US4	HA
1 Exit Device	12 55 8875 F ETJ	4	SA
1 Closer	1461T STDTRK	LBRNZ	LC
1 Rim Cylinder(s)	CR3000	606	CR
1 Kick Plate(s)	190S 8" x 2" LDW	US4	HA
1 Perimeter Seal	S88 x LAR		PE

Set #02

Doors: 1400CB

2 Hinge(s)	BB1168 4 1/2" x 4 1/2" NRP	US4	HA
1 Hinge(s)	BB1168 4 1/2" x 4 1/2" ETW	US4	HA
1 Exit Device	12 55 8875 F ETJ	4	SA
1 Rim Cylinder(s)	CR3000	606	CR
1 Closer(s)	4040XP REGARM	LBRNZ	LC
1 Kick Plate(s)	190S 8" x 2" LDW	US4	HA
1 Wall Stop(s)	232W	US4	HA
1 Smoke Seal	S88 x LAR		PE
1 Door Position Switch(es)	By Access Control Provider		BYOT
1 Power Supply	By Access Control Provider		BYOT
1 Card Reader(s)	By Access Control Provider		BYOT
1 Wiring Diagrams	Wiring Diagrams		

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Set #02

NOTE: Description of Operation:  
 Door is normally closed and locked  
 Presenting authorized credential unlocks door granting access  
 Free egress at all times  
 Door to unlock with power loss or fire alarm activation  
 Door is monitored via access control system

Set #03

Doors: 1200, 1200A, 1400, 1400A

3 Hinge(s)	BB1168 4 1/2" x 4 1/2" NRP	US4	HA
1 Push Plate(s)	30S 8" x 16"	US4	HA
1 Pull Plate(s)	H 33J 4" x 16"	US4	HA
1 Closer(s)	4040XP REGARM	633	LC
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA

Set #04

Door: 1416, 1420

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Mortise Storeroom Lockset	L9080L 03A	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Wall Stop(s)	232W	US4	HA
3 Silencers	307D	GREY	HA
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA

Set #05

Doors: 1201, 1210, 1413, 1419

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Mort Privacy w/Indicator	L9040 03A OS-OCC	606	SC
1 Closer(s)	4040XP REGARM	LBRNZ	LC
1 Mop Plate(s)	190S 4" x 34" LDW	US4	HA
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
1 Wall Stop(s)	232W	US4	HA
3 Silencers	307D	GREY	HA

Set #06

Doors: 1202, 1209, 1414

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Mortise Storeroom Lockset	L9080L 03A	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Overhead Stop(s)	4420 Series (Size as Req'd)	US4	AB
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
3 Silencers	307D	GREY	HA

Set #07

Doors: 1203, 1204, 1205, 1207, 1208, 1226, 1227, 1404, 1408, 1409

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Classroom Lockset	L9070L 03A	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Wall Stop(s)	232W	US4	HA
3 Silencers	307D	GREY	HA

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Set #08

Doors: 1211

2 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Hinge(s)	BB1279 4 1/2" x 4 1/2" ETW	US4	HA
1 Electrified Lockset	L9092 EU B 03A RX	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Closer(s)	4040XP RWPA	LBRNZ	LC
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
1 Wall Stop(s)	232W	US4	HA
3 Silencers	307D	GREY	HA
1 Door Position Switch(es)	By Access Control Provider		BYOT
1 Power Supply	By Electrical Contractor		BYOT
1 Card Reader(s)	By Access Control Provider		BYOT
1 Wiring Diagrams	Wiring Diagrams		BYOT

NOTE: Description of Operation:

Door is normally closed and locked  
Presenting authorized credential unlocks door granting access  
Free egress at all times  
Door to remain locked with power loss or fire alarm activation  
Door is monitored via access control system

Set #09

Doors: 1226A, 1232A, 1401, 1411

1 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
2 Spring Hinge(s)	1250 4 1/2" x 4 1/2"	US4	HA
1 Mortise Storeroom Lockset	L9080L 03A	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
1 Wall Stop(s)	232W	US4	HA
3 Silencers	307D	GREY	HA

Set #10

Doors: 1228, 1405, 1406

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Classroom Lockset	L9070L 03A	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Concealed Overhead Stop(s)	4020 Series (Size as Req'd)	US4	AB
3 Silencers	307D	GREY	HA

Set #11

Doors: 1001

2 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Hinge(s)	BB1279 4 1/2" x 4 1/2" ETW	US4	HA
1 Exit Device	12 55 8875 F ETJ	4	SA
1 Rim Cylinder(s)	CR3000	606	CR
1 Closer(s)	4040XP REGARM	633	LC
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
1 Wall Stop(s)	232W	US4	HA
1 Power Supply	By Access Control Provider		BYOT
1 Door Position Switch(es)	By Access Control Provider		BYOT
1 Card Reader(s)	By Access Control Provider		BYOT
1 Wiring Diagrams	Wiring Diagrams		BYOT



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Set #11

NOTE: Description of Operation:  
 Door is normally closed and locked  
 Presenting authorized credential unlocks door granting access  
 Free egress at all times  
 Door to unlock in the event of power loss.  
 Door is monitored via access control.

Set #11A

Doors: 1229

2 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Hinge(s)	BB1279 4 1/2" x 4 1/2" ETW	US4	HA
1 Exit Device	12 55 8875 F ETJ	4	SA
1 Rim Cylinder(s)	CR3000	606	CR
1 Closer(s)	4040XP REGARM	633	LC
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
1 Wall Stop(s)	232W	US4	HA
1 Seal	726 x LAR		PE
1 Power Supply	By Access Control Provider		BYOT
1 Door Position Switch(es)	By Access Control Provider		BYOT
1 Card Reader(s)	By Access Control Provider		BYOT
1 Wiring Diagrams	Wiring Diagrams		BYOT

NOTE: Description of Operation:  
 Door is normally closed and locked  
 Presenting authorized credential unlocks door granting access  
 Free egress at all times  
 Door to unlock in the event of power loss.  
 Door is monitored via access control.

Set #12

Doors: 1230, 1231, 1410

3 Hinge(s)	BB1279 4 1/2" x 4 1/2"	US4	HA
1 Mortise Classroom Lockset	L9070L 03A	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Wall Stop(s)	232W	US4	HA
3 Silencers	307D	GREY	HA

Set #13

Doors: 1232, 1421

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Mortise Storeroom Lockset	L9080L 03A (Knurled)	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Closer(s)	4040XP RWPA	LBRNZ	LC
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
1 Wall Stop(s)	232W	US4	HA
3 Silencers	307D	GREY	HA

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Set #14

Doors: 1402

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Keypad Lockset	CO-200-MS-70-KP-TLR J CO7	606	LO
1 LFIC Core(s)	CR8000	606	CR
1 Closer(s)	4040XP REGARM	LBRNZ	LC
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
1 Wall Stop(s)	232W	US4	HA

Set #15

Doors: 1415

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Mortise Classroom Lockset	L9070L 03A	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Closer(s)	4040XP CUSH	LBRNZ	LC
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
1 Concealed Overhead Stop(s)	4020 Series (Size as Req'd)	US4	AB

Set #17

Doors: 1417

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Mortise Entrance Lockset	L9050L 03A	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Closer(s)	4040XP REGARM	LBRNZ	LC
1 Concealed Overhead Stop(s)	4020 Series (Size as Req'd)	US4	AB
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
1 Wall Stop(s)	232W	US4	HA
1 Perimeter Seal	S88 x LAR		PE

Set #18

Doors: 1418

2 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Hinge(s)	BB1279 4 1/2" x 4 1/2" ETW	US4	HA
1 Electrified Lockset	L9092 EU B 03A RX	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Closer(s)	4040XP CUSH	LBRNZ	LC
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
3 Silencers	307D	GREY	HA
1 Door Position Switch(es)	By Access Control Provider		BYOT
1 Power Supply	By Access Control Provider		BYOT
1 Card Reader(s)	By Access Control Provider		BYOT
1 Wiring Diagrams	Wiring Diagrams		

NOTE: Description of Operation:  
 Door is normally closed and locked  
 Presenting authorized credential unlocks door granting access  
 Free egress at all times  
 Door to remain locked with power loss or fire alarm activation  
 Door is monitored via access control system

Set #19

Doors: 1003

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Existing door, frame & hardware to remain. Balance existing hardware. Security to add devices. Reference security drawings.

Set #20

Doors: 1002

1 Exit Device	12 55 8875 F ETJ	4	SA
1 Closer	1461T STDTRK	LBRNZ	LC
1 Rim Cylinder(s)	CR3000	606	CR

Set #21

Doors: 1233, 1403, 1412

3 Hinge(s)	BB1279 4 1/2" x 4 1/2" NRP	US4	HA
1 Mortise Storeroom Lockset	L9080L 03A (Knurled)	606	SC
1 Mortise Cylinder(s)	CR1000 x LAR	606	CR
1 Overhead Stop(s)	4420 Series (Size as Req'd)	US4	AB
1 Closer(s)	4040XP REGARM	633	LC
1 Kick Plate(s)	190S 8" x 34" LDW	US4	HA
3 Silencers	307D	GREY	HA

**END OF SECTION 08 7100**



**SECTION 08 8000 - GLAZING**

**PART 1 - GENERAL**

1.1 SUMMARY

A. Section Includes:

1. Glass products.
2. Miscellaneous glazing materials.

B. Related Requirements:

1. Section 08 1123 "Hollow Metal Frames" for framing to receive glazing.
2. Section 08 1416 "Flush Wood Doors" for glass for door lights.

1.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors and who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

**1.7 WARRANTY**

- A. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent (3/1000) within specified warranty period. Coverage for any other cause is excluded.

1. Warranty Period: Five years from date of Substantial Completion.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Source Limitations for Glass: Obtain glass from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

**2.2 PERFORMANCE REQUIREMENTS**

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.

**2.3 GLASS PRODUCTS, GENERAL**

- A. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness and safety glazing standard with which glass complies.
- B. Thickness: Where glass thickness is indicated, it is a minimum.
- C. Strength: Provide fully tempered float glass.

**2.4 GLASS PRODUCTS**

- A. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

**2.5 GLAZING SEALANTS**

- A. General:
  - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

**2.6 GLAZING TAPES**

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

**2.7 MISCELLANEOUS GLAZING MATERIALS**

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks:
  - 1. EPDM with Shore A durometer hardness of 85, plus or minus 5.
  - 2. Type recommended in writing by sealant or glass manufacturer.
- D. Spacers:
  - 1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
  - 2. Type recommended in writing by sealant or glass manufacturer.
- E. Edge Blocks:
- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

**2.8 FABRICATION OF GLAZING UNITS**

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
  - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
    - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine framing, glazing channels and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Minimum required face and edge clearances.
  - 3. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

**3.3 GLAZING, GENERAL**

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.



- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch- (3-mm-) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow and similar characteristics.
- I. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- J. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

**3.5 GASKET GLAZING (DRY)**

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

**3.6 CLEANING AND PROTECTION**

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

**END OF SECTION 08 8000**

## SECTION 08 9119 - FIXED LOUVERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Fixed formed-metal louvers.

B. Related Requirements:

1. Division 23 "Mechanical" sections for ductwork to be connected to louvers.

#### 1.2 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).
- C. Vertical Louver: Louver with vertical blades (i.e., the axis of the blades are vertical).
- D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven-rain performance, as determined by testing in accordance with AMCA 500-L.
- F. Windborne-Debris-Impact-Resistant Louver: Louver that provides specified windborne-debris-impact resistance, as determined by testing in accordance with AMCA 540.

#### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1. Show weep paths, gaskets, flashings, sealants and other means of preventing water intrusion.
2. Show mullion profiles and locations.

C. Samples: For each type of metal finish required.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
  - 1. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 WARRANTY

- A. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.
  - 1. Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Warranty Period: 20 years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Airolite Company, LLC (The)).
  - 2. Construction Specialties, Inc.
  - 3. Reliable Products, Inc.
  - 4. Air Distribution Technologies, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures are considered to act normal to the face of the building.
  - 1. Wind Loads:

- a. Determine loads based on pressures as indicated on Drawings.
- B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width in accordance with AMCA 500-L.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

## 2.3 FIXED FORMED-METAL LOUVERS

- A. Horizontal Drainable-Blade Louver, Formed Metal:
  1. Louver Depth: 4 inches (100 mm).
  2. Frame and Blade Material and Nominal Thickness:
    - a. Galvanized-steel sheet, not less than 0.052 inch (1.32 mm) for frames and 0.040 inch (1.02 mm) for blades.
  3. Mullion Type: Exposed.
  4. Louver Performance Ratings:
    - a. Free Area: Not less than 7.0 sq. ft. (0.65 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
    - b. Point of Beginning Water Penetration: Not less than 800 fpm (4.1 m/s).
    - c. Air Performance:
      - 1) Not more than 0.10-inch wg (25-Pa) static pressure drop at 800-fpm (4.1-m/s) free-area exhaust or intake velocity.
  5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

## 2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
  1. Screen Location for Fixed Louvers: Interior face.
  2. Screening Type: Bird screening.
- B. Secure screen frames to louver frames with stainless steel machine screws or machine screws with heads finished to match louver, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
  1. Metal: Same type and form of metal as indicated for louver to which screens are attached.

2. Finish: Same finish as louver frames to which louver screens are attached.

D. Louver Screening for Galvanized-Steel Louvers:

1. Bird Screening, Galvanized Steel: 1/2-inch- (13-mm-) square mesh, 0.041-inch (1.04-mm) wire.

## 2.5 MATERIALS

A. Galvanized-Steel Sheet: ASTM A653/A653M, G60 (Z180) zinc coating, mill phosphatized.

B. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
2. For fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless steel fasteners.
3. For color-finished louvers, use fasteners with heads that match color of louvers.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

## 2.6 FABRICATION

A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

1. Frame Type: Channel unless otherwise indicated.

D. Include supports, anchorages and accessories required for complete assembly.

E. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

## 2.7 GALVANIZED-STEEL SHEET FINISHES

A. Finish louvers after assembly.

B. Surface Preparation: Clean surfaces with nonpetroleum solvent, so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair in accordance with ASTM A780/A780M.

- C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 2 mils (0.05 mm).
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

#### **3.3 INSTALLATION**

- A. Locate and place louvers level, plumb and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 07 9200 "Joint Sealants" for sealants applied during louver installation.

#### **3.4 ADJUSTING AND CLEANING**

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

- C. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
  - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

**END OF SECTION 08 9119**



**SECTION 09 2216 - NON-STRUCTURAL METAL FRAMING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.

- B. Related Requirements:

- 1. Section 08 1123 "Hollow Metal Frames" for door frames to be installed in hollow metal framed walls.
- 2. Section 09 2900 "Gypsum Board Assemblies" for materials to be attached to non-structural metal framing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

**PART 2 - PRODUCTS**

2.1 DESCRIPTION

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 2. Protective Coating: ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized, unless otherwise indicated.

- B. Studs and Runners: ASTM C 645.
  - 1. Steel Studs and Runners:
    - a. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm). Products with effective metal thickness from embossing or stamping will not be acceptable.
    - b. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide the following:
  - 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
  - 2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. Products: Subject to compliance with requirements, provide products by one of the following:
      - 1) Dietrich Metal Framing.
      - 2) Steel Network Inc. (The).
      - 3) Superior Metal Trim.
- D. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
  - 1. Depth: 1-1/2 inches (38 mm).
  - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch-(1.72-mm-) thick, galvanized steel.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
  - 1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
  - 2. Depth: 7/8 inch (22.2 mm).
- F. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-metal thickness of 0.018 inch (0.45 mm), and depth required to fit insulation thickness indicated.

## 2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION, GENERAL**

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Brace tops of walls to roof deck as indicated.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

**3.3 INSTALLING FRAMED ASSEMBLIES**

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
  - 1. Space studs as follows:
    - a. Single-Layer Application: 16 inches (406 mm) o.c., unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- D. Z-Furring Members:
1. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
  2. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

**END OF SECTION 09 2216**

**SECTION 09 2400 – PLASTER PATCHING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes patching of existing concealed plaster sub-ceilings:

1. Metal lath.
2. Base-coat cement plaster.
3. Cement plaster finish coats.
4. Accessories.

B. Related Sections:

1. Section 01 2100 "Allowances."
2. Section 01 2200 "Unit Prices."

**1.2 ACTION SUBMITTALS**

A. Product Data: For each type of product.

**1.3 MOCKUPS**

**1.4 DELIVERY, STORAGE AND HANDLING**

A. Store materials inside under cover and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

**1.5 FIELD CONDITIONS**

A. Comply with ASTM C926 requirements.

B. Interior Plasterwork: Maintain room temperatures at greater than 40 deg F (4.4 deg C) for at least 48 hours before plaster application, and continuously during and after application.

1. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
2. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

**PART 2 - PRODUCTS**

2.1 SOURCE LIMITATIONS

- A. Obtain plaster materials from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Where indicated, provide cement plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E119 by a qualified testing agency.

2.3 METAL LATH

- A. Expanded-Metal Lath: ASTM C847, cold-rolled carbon-steel sheet with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.

- 1. Diamond-Mesh Lath: Flat, 2.5 lb/sq. yd. (1.4 kg/sq. m).

2.4 BASE-COAT CEMENT PLASTER

- A. General: Comply with ASTM C926 for applications indicated.

- 1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.

- B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

- 1. Masonry Cement Mixes:

- a. Scratch Coat: Mix 1 part masonry cement and 2-1/2 to 4 parts aggregate.
- b. Brown Coat: Mix 1 part masonry cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.

- 2. Plastic Cement Mixes:

- a. Scratch Coat: Mix 1 part plastic cement and 2-1/2 to 4 parts aggregate.
- b. Brown Coat: Mix 1 part plastic cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.

2.5 CEMENT PLASTER FINISH COATS

- A. Job-Mixed Finish-Coat Mixes:

- 1. Masonry Cement Mix: Use 1 part masonry cement and 1-1/2 to 3 parts aggregate.
- 2. Plastic Cement Mix: Use 1 part plastic cement and 1-1/2 to 3 parts aggregate.

**2.6 ACCESSORIES**

- A. General: Comply with ASTM C1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Metal Accessories:
  - 1. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.
  - 2. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
  - 3. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
  - 4. Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.

**2.7 PLASTER MATERIALS**

- A. Masonry Cement: ASTM C91/C91M, Type N.
  - 1. Color for Finish Coats: Match existing.
- B. Plastic Cement: ASTM C1328/C1328M.
- C. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color to match existing.
- D. Lime: ASTM C206, Type S; or ASTM C207, Type S.
- E. Sand Aggregate: ASTM C897.
  - 1. Color for Job-Mixed Finish Coats: White.
- F. Perlite Aggregate: ASTM C35.

**2.8 MISCELLANEOUS MATERIALS**

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in cement plaster.
- C. Fasteners for Attaching Metal Lath to Substrates: ASTM C1063.
- D. Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter unless otherwise indicated.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Protect adjacent work from soiling, spattering, moisture deterioration and other harmful effects caused by plastering.
- B. Prepare smooth, solid substrates for plaster according to ASTM C926.

**3.3 INSTALLATION, GENERAL**

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

**3.4 INSTALLATION OF METAL LATH**

- A. Metal Lath: Install according to ASTM C1063.
  - 1. Flat-Ceiling and Horizontal Framing: Install flat-diamond-mesh lath.

**3.5 INSTALLATION OF ACCESSORIES**

- A. Install according to ASTM C1063 and at locations indicated on Drawings.
- B. Control Joints: Install at existing locations that require replacement.

**3.6 APPLICATION OF BASE-COAT CEMENT PLASTER**

- A. General: Comply with ASTM C926.
  - 1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6 mm in 3 m) from a true plane in finished plaster surfaces when measured by a 10-foot (3-m) straightedge placed on surface.
  - 2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
  - 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Ceilings; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, match existing system for total thickness, as follows:



1. Masonry cement mixes.
2. Plastic cement mixes.

C. Ceilings; Base-Coat Mix: For base (scratch) coat, match existing, as follows:

1. Masonry cement mix.
2. Plastic cement mix.

### 3.7 APPLICATION OF CEMENT PLASTER FINISH COATS

A. Plaster Finish Coats: Apply to provide finish to match existing.

B. Concealed Interior Plasterwork:

1. Where plaster application is concealed above suspended ceilings and in similar locations, omit finish coat.

### 3.8 REPAIR

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs and similar defects and where bond to substrate has failed.

### 3.9 CLEANING

A. Remove temporary protection and enclosure of other work after plastering is complete.

B. Promptly remove plaster from door frames, windows and other surfaces not indicated to be plastered.

C. Repair floors, walls, and other surfaces stained, marred or otherwise damaged during plastering.

**END OF SECTION 09 2400**



**SECTION 09 2900 - GYPSUM BOARD ASSEMBLIES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

A. Section Includes:

1. Interior gypsum board.
2. Sound attenuation blankets.
3. Tile backing panels.
4. Soundproofing barrier.
5. Soundproofing compound.

B. Related Requirements:

1. Section 09 2216 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.

- B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

**1.5 FIELD CONDITIONS**

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. **STC-Rated Assemblies:** For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

### **2.2 GYPSUM BOARD, GENERAL**

- A. **Size:** Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### **2.3 INTERIOR GYPSUM BOARD**

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  1. Georgia-Pacific Gypsum LLC.
  2. National Gypsum Company.
  3. USG Corporation.
- B. **Gypsum Board, Type X:** ASTM C 1396/C 1396M.
  1. Thickness: 5/8 inch (15.9 mm).
  2. Long Edges: Tapered.
- C. **Gypsum Ceiling Board:** ASTM C 1396/C 1396M.
  1. Thickness: 5/8 inch (15.9 mm).
  2. Long Edges: Tapered.
- D. **Gypsum Board to be Laminated to Substrate:** ASTM C 1396/C 1396M.
  1. Thickness: 1/4 inch (6.2 mm).
  2. Long Edges: Tapered.

### **2.4 TILE BACKING PANELS**

- A. **Cementitious Backer Units:** ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.
  1. Thickness: 5/8 inch (15.9 mm).
  2. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

**2.5 SOUNDPROOFING BARRIER**

- A. Manufactures: Subject to compliance with requirements, provide products by one of the following:
  - 1. Acoustical Solutions
  - 2. AcoustiMAC
  - 3. ATS Acoustics
- B. Mass Loaded Vinyl (MLV) Soundproof Barrier
- C. Sheet Dimensions:
  - 1. 4' by 10' sheet size (1219 mm x 3048 mm)
  - 2. 4' x 25' sheet size
  - 3. (Thickness) .25 (0.635 mm)
- D. Sheet Weight: 2.0 lb/ft
- E. Product Performance:
  - 1. Minimum STC 26 per ASTM E 90-02 or SAE j1400
  - 2. Flammability rating of class 1 per ASTM E 84 Rev. A, behind minimum 3/8" drywall
  - 3. No fungal or algal growth and no visible disfigurement per ASTM D3273 and ASTM G 21.
  - 4. R-Value @ 1" 4.366.
- F. Installation Instructions:
  - 1. Follow Manufacturer directions.

**2.6 TRIM ACCESSORIES**

- A. Interior Trim: ASTM C 1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
  - 2. Shapes:
    - a. Cornerbead.
    - b. L-Bead: L-shaped; exposed long flange receives joint compound.
    - c. Expansion (control) joint.
- B. Architectural Reveals:
  - 1. Anodized brushed bronze, Z , 1/2" x 1/2" x 1/2" (12.7 mm by 12.7 mm by 12.7mm).

**2.7 AUXILLARY MATERIALS**

- A. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
- B. Noise Reduction Compound: Viscoelastic damping compound.
  - 1. Basis of Design: Green Glue as manufactured by Certainteed Corp. Subject to compliance with requirements, provide the named product or comparable product submitted and approved in accordance with Division 1 requirements.

**2.8 JOINT TREATMENT MATERIALS**

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
  - 2. Tile Backing Panels: As recommended by the panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
  - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels: As recommended by the backing panel manufacturer.

**2.9 AUXILIARY MATERIALS**

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
  - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
- D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. This product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
    - b. Grabber Construction Products; Acoustical Sealant GSC.
    - c. Pecora Corporation; AC-20 FTR.
    - d. USG Corporation; SHEETROCK Acoustical Sealant.
  - 2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 APPLYING AND FINISHING PANELS, GENERAL**

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side. Overlap sound batts at both sides and top of sound partitions as indicated.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Type X: Vertical surfaces unless otherwise indicated.
  - 2. Ceiling Type: Ceiling and bulkhead surfaces.
- B. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
  - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

### 3.4 INSTALLATION OF TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

### 3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners, unless otherwise indicated.
  - 2. L-Bead: Use at exposed edges.

### 3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.



- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840.
  - 1. Level 5: All locations.

**3.7 PROTECTION**

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

**END OF SECTION 09 2900**



**SECTION 09 3013 - CERAMIC TILING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Ceramic mosaic tile.
2. Porcelain tile.
3. Glazed wall tile.
4. Stone thresholds.
5. Waterproof membranes.
6. Crack isolation membranes.
7. Metal edge strips.

**B. Related Requirements:**

1. Section 09 2900 "Gypsum Board Assemblies" for tile backing panels.

**1.2 ACTION SUBMITTALS**

**A. Product Data:** For each type of product.

**B. Samples for Verification:**

1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches (300 mm) square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory for each color and finish required].
4. Stone thresholds in 6-inch (150-mm) lengths.
5. Metal edge strips in 6-inch (150-mm) lengths.

**1.3 MAINTENANCE MATERIAL SUBMITTALS**

**A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.**

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

**1.5 FIELD CONDITIONS**

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
  - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
  - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
  - 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
  - 1. Stone thresholds.
  - 2. Waterproof membrane.
  - 3. Crack isolation membrane.
  - 4. Metal edge strips.

**2.2 PRODUCTS, GENERAL**

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.

- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

## 2.3 TILE PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following, as indicated on the Finish Schedule:
  - 1. Florim.
  - 2. Milestone.
  - 3. L'Antic Colonial.
  - 4. Portobello.
- B. Ceramic Tile (W30): Unglazed porcelain tile.
  - 1. Basis of Design: As indicated in the Finish Schedule on the drawings.
  - 2. Composition: Porcelain.
  - 3. Face Size: 12-inches by 24-inches.
  - 4. Face Size Variation: Rectified.
  - 5. Thickness: 7mm.
  - 6. Face: Matte with square edges.
  - 7. Surface: Smooth.
  - 8. Tile Color and Pattern: As indicated in the Finish Schedule on the drawings.
  - 9. Grout Color: As selected by the Architect from manufacturer's full range.
- C. Ceramic Tile (W40): Marble/glazed ceramic accent tile.
  - 1. Basis of Design: As indicated in the Finish Schedule on the drawings.
  - 2. Composition: Porcelain.
  - 3. Modular Size: 12-inches by 13-inches (mosaic sheet).
  - 4. Thickness: 9mm.
  - 5. Face: Pattern of design indicated, with cushion edges.
  - 6. Surface: Smooth.
  - 7. Tile Color and Pattern: As indicated in the Finish Schedule on the drawings.
  - 8. Grout Color: As selected by the Architect from manufacturer's full range.
- D. Ceramic Tile (F40): Unglazed porcelain tile.
  - 1. Basis of Design: As indicated in the Finish Schedule on the drawings.
  - 2. Composition: Porcelain.
  - 3. Face Size: 12-inches by 12-inches.
  - 4. Face Size Variation: Rectified.
  - 5. Thickness: 8mm.
  - 6. Face: Matte with square edges.
  - 7. Dynamic Coefficient of Friction: Not less than 0.42.
  - 8. Tile Color, Glaze and Pattern: As indicated in the Finish Schedule on the drawings.

9. Grout Color: As selected by the Architect from manufacturer's full range.

**E. COVE BASE**

1. Trim Units (B40): Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
  - a. Cove Base: Surface bullnose, modular size same as adjoining flat tile.
  - b. Basis of Design: As indicated in the Finish Schedule on the drawings.

**F. Wall Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:**

1. External Corners for Thin-Set Mortar Installations: Schluter-JOLLY or equal. L-shaped profile with 1/8 inch (3.2 mm) wide top section and 3/16 - 1/2 inch (4.5 - 12.5 mm) wide face, that form the visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer. Color to be selected from manufacturer's full range. Install according to the manufacturer's current design installation instructions. See drawing details for more information.
2. Internal Corners: Field-buttet square corners except with coved base and cap angle pieces designed to fit with stretcher shapes.

**2.4 THRESHOLDS**

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
  1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of 10 according to ASTM C1353 or ASTM C241/C241M and with honed finish.
  1. Description: Uniform, fine- to medium-grained white stone with gray veining.

**2.5 TILE BACKING PANELS**

- A. Cementitious Backer Units: As specified in Section 09 2900 "Gypsum Board Assemblies."

**2.6 WATERPROOF MEMBRANES**

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Waterproof Membrane, Fabric-Reinforced, Fluid-Applied: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Boiardi Products: Elastiment 344 Reinforced Waterproofing.
  - b. Laticrete International, Inc.: Laticrete 9235 Waterproof Membrane.
  - c. MAPEI Corporation: Mapelastic 400.

## 2.7 CRACK ISOLATION MEMBRANES

- A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Crack Isolation Membrane, Fabric-Reinforced, Fluid-Applied: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.
  1. Boiardi Products: Elastiment 344 Reinforced Waterproofing and Anti-Fracture/Crack Suppression Membrane.
  2. Custom Building Products: 9240 Waterproofing and Anti-Fracture Membrane.
  3. TEC: H.B. Fuller Construction Products, Inc.: HydraFlex Waterproof Crack Isolation Membrane.

## 2.8 SETTING MATERIALS

- A. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.
  1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
  2. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
  3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.15.

## 2.9 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.
- B. Water-Cleanable Epoxy Grout: ANSI A118.3.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Bostik, Inc.: EzPoxy.
    - b. Laticrete International, Inc.: Spectralock Pro Premium.
    - c. MAPEI Corporation: Kerapoxy.
  2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F (60 and 100 deg C), respectively, and certified by manufacturer for intended use.

**2.10 MISCELLANEOUS MATERIALS**

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- D. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Custom Building Products: Grout and tile Sealer.
    - b. Laticrete International, Inc.: Bulletproof Sealer..
    - c. MAPEI Corporation: Penetrating Stone, Tile and Grout Sealer.

**2.11 MIXING MORTARS AND GROUT**

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.



**3.2 PREPARATION**

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

**3.3 INSTALLATION OF CERAMIC TILE**

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
  - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
    - a. Tile floors in wet areas.
    - b. Tile floors consisting of tiles 8 by 8 inches (200 by 200 mm) or larger.
    - c. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
  - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
  - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.

3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
  2. Glazed Wall Tile: 1/16 inch (1.6 mm).
  3. Porcelain Tile: 1/4 inch (6.4 mm).
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in improved modified dry-set mortar (thinset).
  2. Do not extend waterproof membrane or crack isolation membrane under thresholds set in improved modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on waterproof membrane or crack isolation membrane with elastomeric sealant.
- J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet or other flooring that finishes flush with top of tile.
- K. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- 3.4 INSTALLATION OF WATERPROOF MEMBRANES
- A. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
  - B. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.
- 3.5 INSTALLATION OF CRACK ISOLATION MEMBRANES
- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
  - B. Allow crack isolation membrane to cure before installing tile or setting materials over it.
- 3.6 ADJUSTING AND CLEANING
- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove grout residue from tile as soon as possible.
  - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

**3.7 PROTECTION**

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

**END OF SECTION 09 3013**



**SECTION 09 5123 - ACOUSTICAL TILE CEILINGS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Acoustical tiles for interior ceilings.

- B. Related Requirements:

- C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

- 1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
  - 2. Concealed Suspension-System Members: 6-inch- (150-mm-) long Sample of each type.
  - 3. Exposed Moldings and Trim: Set of 6-inch- (150-mm-) long Samples of each type and color.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage

from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

## 1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
  - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations:
  - 1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
  - 2. Directly Attached Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Class A according to ASTM E1264.
  - 2. Smoke-Developed Index: 450 or less.
- B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL or from the listings of another qualified testing agency.

### 2.3 ACOUSTICAL TILES - LAY-IN (C10)

- A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- B. Basis of Design (C10): Acoustical ceiling tiles are based on Mesa 680 Lay-In as manufactured by Armstrong World Industries. Subject to compliance with requirements, provide the named products or comparable products by one of the following:

1. CertainTeed Corporation
  2. USG Company.
- C. Color: White.
- D. Light Reflectance (LR): Not less than 0.85.
- E. Ceiling Attenuation Class (CAC): Not less than 33.
- F. Noise Reduction Coefficient (NRC): Not less 0.60.
- G. Edge/Joint Detail: Square.
- H. Thickness: 15/16 inch (23.8 mm).
- I. Modular Size: 24 by 24 inches (610 by 610 mm).
- J. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

**2.4 ACOUSTICAL TILES – TEGULAR (C20)**

- A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- B. Basis of Design (C20): Acoustical ceiling tiles are based on Mesa 681 Tegular as manufactured by Armstrong World Industries. Subject to compliance with requirements, provide the named products or comparable products by one of the following:
1. CertainTeed Corporation
  2. USG Company.
- C. Color: White.
- D. Light Reflectance (LR): Not less than 0.85.
- E. Ceiling Attenuation Class (CAC): Not less than 35.
- F. Noise Reduction Coefficient (NRC): Not less 0.60.
- G. Edge/Joint Detail: Tegular.
- H. Thickness: 15/16 inch (23.8 mm).
- I. Modular Size: 24 by 24 inches (610 by 610 mm).
- J. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

**2.5 ACOUSTICAL TILES – TEGULAR (C50)**

- A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- B. Basis of Design (C50): Acoustical ceiling tiles are based on Calla Health Zone AirAssure Tegular as manufactured by Armstrong World Industries. Subject to compliance with requirements, provide the named products or comparable products by one of the following:
  - 1. CertainTeed Corporation
  - 2. USG Company.
- C. Color: White.
- D. Texture: Smooth.
- E. Light Reflectance (LR): Not less than 0.85.
- F. Ceiling Attenuation Class (CAC): Not less than 40.
- G. Noise Reduction Coefficient (NRC): Not less than 0.80.
- H. Edge/Joint Detail: Tegular.
- I. Thickness: 15/16 inch (23.8 mm).
- J. Modular Size: 24 by 24 inches (610 by 610 mm).
- K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

**2.6 METAL SUSPENSION SYSTEM**

- A. Metal Suspension-System Standard: Provide manufacturer's standard metal suspension system and accessories of type, structural classification and finish indicated that complies with applicable requirements in ASTM C635/C635M.
  - 1. Manufacturers: Same manufacturer as suspended ceiling tiles.
- B. Direct-Hung, Double-Web, Fire Rated Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 (Z90) coating designation.
  - 1. Structural Classification: Intermediate-duty system.
  - 2. Access: Upward and end pivoted or side pivoted, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.



**2.7 ACCESSORIES**

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- B. Wire Hangers, Braces and Ties: Provide wires as follows:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
  - 2. Stainless-Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
  - 3. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- (2.69-mm-) diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

**2.8 METAL EDGE MOLDINGS AND TRIM**

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.
  - 1. Manufacturers: Same manufacturer as metal suspension system.
  - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
  - 3. Finish: Painted white.

**2.9 ACOUSTICAL SEALANT**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Acoustical Sealant for Exposed and Concealed Joints:
    - a. Pecora Corporation.
    - b. USG Corporation.
    - c. Pecora Corporation.
    - d. Tremco, Inc.
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
  - 1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
  - 2. Acoustical sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

**3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS**

- A. Install suspended acoustical tile ceilings according to ASTM C636/C636M and manufacturer's written instructions.
  - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
  7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  8. Do not attach hangers to steel deck tabs.
  9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
  11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
  2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends. Miter corners accurately and connect securely.
  3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install tiles in a basketweave pattern.
- F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.
1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
  2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches (305 mm) o.c.
  3. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.
- 3.4 ERECTION TOLERANCES
- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.
  - B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.
- 3.5 CLEANING
- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

- B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

**END OF SECTION 09 5123**

**SECTION 09 6513 - RESILIENT BASE AND ACCESSORIES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Resilient base.
  - 2. Resilient molding accessories.
- B. Related Sections:
  - 1. Section 09 6813 "Tile Carpeting" for carpet.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern and size of resilient product installed.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.7 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Install resilient products after other finishing operations, including painting, have been completed.

**PART 2 - PRODUCTS**

2.1 RESILIENT BASE

- A. Resilient Base (B10):
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Armstrong World Industries, Inc.
    - b. Flexco, Inc.
    - c. Johnsonite.
    - d. Roppe Corporation.
- B. Resilient Base Standard: ASTM F 1861.
  - 1. Material Requirement: Type TS (rubber, vulcanized thermoset).
  - 2. Manufacturing Method: Group I (solid, homogeneous).
  - 3. Style: Cove (base with toe).
- C. Minimum Thickness: 0.125 inch (3.2 mm).
- D. Height: 4 inches (102 mm).
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed. Preformed corners shall be same material, color, thickness and height as the resilient base.

1. Job-formed outside corners may be acceptable provided a mock-up is approved by the Architect. Upon approval by the Architect, job formed outside corners shall be constructed by the same installer that created the mock-up.

G. Inside Corners: Job formed.

H. Color: As indicated in the Finish Schedule on the drawings.

## 2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory (RN1 & TR1):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Flexco, Inc.
- b. Johnsonite.
- c. Ropes Corporation, USA.

B. Description: Carpet edge for glue-down applications.

C. Material: Rubber.

D. Colors and Patterns: As selected by the Architect from manufacturer's full range.

## 2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
  - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

**3.3 RESILIENT BASE INSTALLATION**

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Preformed Corners: Install preformed corners before installing straight pieces.
- G. Job-Formed Corners:
  - 1. Inside Corners: Use straight pieces of maximum lengths possible.

**3.4 RESILIENT ACCESSORY INSTALLATION**

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece.

**3.5 CLEANING AND PROTECTION**

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.



2. Sweep and vacuum surfaces thoroughly.
  3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products until Substantial Completion.

**END OF SECTION 09 6513**



**SECTION 09 6519 - RESILIENT TILE FLOORING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Vinyl composition floor tile.

- B. Related Sections:

- 1. Section 09 6513 "Resilient Base and Accessories" for resilient base, reducer strips, stair tread nosings and other accessories installed with resilient floor coverings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units of each color and pattern of floor tile required.
- C. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.5 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Floor Tile: Furnish 1 box of each type, color and pattern of floor tile installed.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

**1.8 PROJECT CONDITIONS**

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Close spaces to traffic during floor tile installation and for 48 hours after floor tile installation.
- D. Install floor tile after other finishing operations, including painting, have been completed.

**PART 2 - PRODUCTS**

**2.1 VINYL COMPOSITION FLOOR TILE**

- A. Basis of Design (F50): Vinyl composition floor tile is based on Premium Excelon as manufactured by Armstrong World Industries, Inc. Subject to compliance with requirements, provide the named products or comparable products by one of the following:
  - 1. Congoleum Corporation.
  - 2. Mannington Mills, Inc.
  - 3. Tarkett, Inc.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch (3.2 mm).
- E. Sizes: 12 by 12 inches.
- F. Tile Types, Colors and Patterns: As indicated in the Finish Schedule on the drawings.

**2.2 ACCESSORIES**

- A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.
- D. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
  - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

#### **3.3 FLOOR TILE INSTALLATION**

- A. Comply with manufacturer's written instructions for installing floor tile.

- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles in pattern of colors and sizes indicated.
- D. Scribe, cut and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive and surface blemishes from floor tile surfaces before applying liquid floor polish.
  - 1. Apply two coats.
- E. Cover floor tile until Substantial Completion.

**END OF SECTION 09 6519**

**SECTION 09 6813 - TILE CARPETING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Modular, tufted carpet tile.

- B. Related Requirements:

- 1. Section 09 6513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
  - a. Review delivery, storage and handling procedures.
  - b. Review ambient conditions and ventilation procedures.
  - c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
- 2. Include manufacturer's written installation recommendations for each type of substrate.

- B. Shop Drawings: For carpet tile installation, plans showing the following:

- 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
- 2. Carpet tile type, color and dye lot.
- 3. Type of subfloor.
- 4. Type of installation.
- 5. Pattern of installation.
- 6. Pattern type, location and direction.
- 7. Pile direction.

8. Type, color and location of insets and borders.
9. Type, color and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

#### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

#### 1.7 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

#### 1.9 FIELD CONDITIONS

A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.



1.10 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 2. Failures include, but are not limited to, the following:
    - a. More than 10 percent edge raveling, snags, and runs.
    - b. Dimensional instability.
    - c. Excess static discharge.
    - d. Loss of tuft-bind strength.
    - e. Loss of face fiber.
    - f. Delamination.
  - 3. Warranty Period: 10 years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 CARPET TILE (F10 & F20)

- A. Basis of Design: Tile carpeting is based on Arcade Legend as manufactured by Bentley Mills. Subject to compliance with requirements, provide the named products or comparable products by one of the following:
  - 1. Mohawk.
  - 2. Milliken.
- B. Construction: Tufted textured loop.
- C. Colors and Patterns: As indicated in the Finish Schedule on the drawings.
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: Type 6.6 Nylon.
- F. Density: 6.013 oz./cu. yd.
- G. Stitches: 10.1 stitches per inch.
- H. Secondary Backing: Manufacturer's standard cushion or hardback tile.
- I. Size: 24 by 24 inches (610 by 610 mm).
- J. Applied Treatments:
  - 1. Soil-Resistance Treatment: Manufacturer's standard treatment.
  - 2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:

- a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

**2.2 CARPET TILE (F30)**

- A. Basis of Design: Tile carpeting is based on From Scratch as manufactured by Bentley Mills. Subject to compliance with requirements, provide the named products or comparable products by one of the following:
  1. Mohawk.
  2. Milliken.
- B. Construction: Tufted textured loop.
- C. Colors and Patterns: As indicated in the Finish Schedule on the drawings.
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: Type 6.6 Nylon.
- F. Density: 8.806 oz./cu. yd.
- G. Stitches: 10.0 stitches per inch.
- H. Secondary Backing: Manufacturer's standard cushion or hardback tile.
- I. Size: 18 by 36 inches (457 by 914 mm).
- J. Applied Treatments:
  1. Soil-Resistance Treatment: Manufacturer's standard treatment.
  2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:
    - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

**2.3 INSTALLATION ACCESSORIES**

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern and potential defects.
- C. Concrete Slabs: Verify that surfaces are free of cracks, ridges, depressions, scale and foreign deposits.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

**3.3 INSTALLATION**

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain pile-direction patterns as indicated on Drawings.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

- G. Install pattern parallel to walls and borders.

**3.4 CLEANING AND PROTECTION**

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

**END OF SECTION 09 6813**

**SECTION 09 7205 – ACOUSTICAL WALL COVERING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Acoustical wall covering.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.
- B. Shop Drawings: Show location and extent of each wall-covering type.
- C. Samples for Verification: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36 inches (914 mm) long in size.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For wall coverings to include in maintenance manuals.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install acoustical wall coverings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for occupants after Project completion during the remainder of the construction period.
- B. Lighting: Do not install acoustical wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.

- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by acoustical wall covering manufacturer for full drying or curing.

## **PART 2 - PRODUCTS**

### 2.1 PERFORMANCE REQUIREMENTS

- A. Flame Resistance: Comply with ASTM E84, Class A, CAN/ULC S102.
- B. Acoustical Value: NRC 0.15, SAA 0.18.
- C. Lightfastness: Class 5, 40 hours.

### 2.2 ACOUSTICAL WALL COVERING

- A. Basis of Design: Acoustical wallcoverings are based on NuFelt as manufactured by Momentum Textiles. Subject to compliance with requirements, provide the named products or comparable products by one of the following:
  - 1. Decrasound
  - 2. Autex.
  - 3. MDC.
- B. Fiber Content: 100-percent recycled polyester.
- C. Backing: Fused polyester.
- D. Weight: 25 oz.
- E. Width: 63 inches.
- F. Thickness: 1/8-inch.
- G. Color and Pattern: As selected by the Architect from manufacturer's full range.

### 2.3 ACCESSORIES

- A. Adhesive: Mildew-resistant, nonstaining adhesive, for use with specific acoustical wall covering and substrate application indicated and as recommended in writing by acoustical wall-covering manufacturer.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation surfaces being true in plane and vertical and horizontal alignment, maximum moisture content, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair bond of acoustical wall covering, including dirt, oil, grease, mold and mildew.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks and defects.
  - 1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
  - 2. Gypsum Board: Apply primer/sealer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
- D. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims and similar items.
- E. Acclimatize acoustical wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

**3.3 INSTALLATION OF ACOUSTICAL WALL COVERING**

- A. Comply with acoustical wall-covering manufacturers' written installation instructions applicable to products and applications indicated.
- B. Installation: Non-reverse hang, random match.
- C. Fully bond acoustical wall covering to substrate. Remove air bubbles, wrinkles, blisters and other defects.

**3.4 CLEANING**

- A. Remove excess adhesive at seams, perimeter edges and adjacent surfaces.
- B. Use cleaning methods recommended in writing by acoustical wall covering manufacturer.
- C. Replace strips that cannot be cleaned.
- D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims and similar items.

**END OF SECTION 09 7205**





## SECTION 097513 - STONE WALL FACING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Dimension stone paneling on interior walls.

- B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for installing concrete inserts for anchoring stone paneling.
- 2. Section 042000 "Unit Masonry" for installing masonry inserts for anchoring stone paneling.
- 3. Section 079200 "Joint Sealants" for sealing joints in stone paneling system with elastomeric sealants.
- 4. Section 093033 "Stone Tiling" for stone wall tile.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project Site.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: Not required. Stone is refurbished from other areas of the building.

- B. Shop Drawings: Show fabrication and installation details for stone paneling system, including dimensions and profiles of stone units.

- 1. Show locations and details of joints both within stone paneling system and between stone paneling system and other finish materials.
- 2. Show locations and details of anchors, including locations of supporting construction.
- 3. Show direction of veining, grain, or other directional pattern.
- 4. Include large-scale shaded drawings of edge details.

- C. Samples for Initial Selection: For joint materials involving color selection.

- D. Samples for Verification: Marble slabs are stored at the following location:
  - 1. Wake County GSA Headquarters  
401 Capital Boulevard  
Raleigh, NC 27603
  - 2. For each color of grout, pointing mortar, and sealant are required.
- E. Delegated-Design Submittal: For stone paneling assembly.

1.5 INFORMATIONAL SUBMITTALS

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Not required.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate stone paneling similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Stone paneling fabricator.
- C. Installer Qualifications: A firm or individual experienced in installing stone paneling similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Sealant Adhesion and Compatibility Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Section 079200 "Joint Sealants," Samples of materials that will contact or affect joint sealants.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
  - 1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
  - 2. Store stone on wood A-frames or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

- B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.
- C. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multicomponent materials.
- D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

#### 1.10 FIELD CONDITIONS

- A. Maintain air and material temperatures to comply with requirements of installation material manufacturers, but not less than 50 deg F (10 deg C) during installation and for seven days after completion.
- B. Field Measurements: Verify dimensions of construction to receive stone paneling by field measurements before fabrication and indicate measurements on Shop Drawings.

#### 1.11 COORDINATION

- A. Coordinate installation of inserts that are to be embedded in concrete or masonry and similar items to be used by stone paneling Installer for anchoring and supporting stone paneling. Furnish setting drawings, templates, and directions for installing such items and deliver to Project site in time for installation.
- B. Time delivery and installation of stone paneling to avoid extended on-site storage and to coordinate with work adjacent to stone paneling.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Source Limitations for Stone: Stone is being refurbished from previous areas of the building. Owner to provide further information obtaining stone slabs.
  - 1. Make stone slabs available for examination by Architect.
    - a. Architect will select aesthetically acceptable slabs.
    - b. Segregate slabs selected for use on Project and mark backs indicating approval.
    - c. Mark and photograph aesthetically unacceptable portions of slabs as directed by Architect.

## 2.2 SEALANTS

- A. Joint Sealants: Manufacturer's standard sealants that comply with applicable requirements in Section 079200 "Joint Sealants" and will not stain the stone they are applied to.
  - 1. Use mildew-resistant joint sealant at plumbing fixtures and for control and expansion joints in toilet rooms.
  - 2. Colors: Provide colors of exposed sealants to match other joints in stone adjoining sealed joints unless otherwise indicated.
- B. Sealant for Filling Kerfs: Same sealant used for joints in stone cladding. Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Section 079200 "Joint Sealants" and that do not stain stone:
  - 1. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
  - 2. Urethane, M, NS, 25, T, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

## 2.3 STONE ANCHORS AND ATTACHMENTS

- A. Wire Tiebacks: No. 9 AWG copper or copper-alloy or 0.120-inch- (3.0-mm-) diameter, stainless-steel wire.
- B. Dovetail Slots: Furnish dovetail slots with filler strips of slot size required to receive anchors provided, fabricated from 0.034-inch- (0.86-mm-) thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 (Z275).
- C. Direct-Mount Anchoring Systems: Stainless-steel stone anchors designed to be applied directly to wall surfaces. System is secured to wall framing, furring, or sheet-metal reinforcing strips built into wall with stainless-steel self-drilling screws. Anchors fit into kerfs or holes in edges of stone panels and do not need setting spots.

## 2.4 STONE ACCESSORIES

- A. Temporary Setting Shims: Rigid plastic shims, nonstaining to stone, sized to suit joint thickness.
- B. Setting Shims for Direct-Mount Anchoring Systems: Strips of resilient plastic or neoprene, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.

- C. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.
- D. Stone Sealer: Colorless, stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.

## 2.5 FABRICATION OF STONE, GENERAL

- A. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association.
  - 1. Where items are installed with adhesive or where stone edges are visible in the finished work, make items uniform in thickness and of identical thickness for each type of item; gage back of stone if necessary.
  - 2. Clean sawed backs of stones to remove rust stains and iron particles.
  - 3. Dress joints straight and at right angle to face unless otherwise indicated.
  - 4. Cut and drill sinkages and holes in stone for anchors, supports, and lifting devices as indicated or needed to set stone securely in place; shape beds to fit supports.
  - 5. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
- B. Finish exposed faces and edges of stone to comply with requirements indicated for finish of each stone type required and to match approved Samples and mockups.
- C. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.
  - 1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved Samples and mockups.

## 2.6 FABRICATION OF STONE PANELING ON WALLS

- A. Arrange panels in shop or other suitable space in proposed orientation and sequence for examination by Architect. Mark units with temporary sequence numbers to indicate position in proposed layout.
  - 1. Lay out one elevation at a time if approved by Architect.
  - 2. Notify Architect seven days in advance of date and time when layout will be available for viewing.
  - 3. Provide lighting of similar type and level as that of final installation for viewing layout unless otherwise approved by Architect.
  - 4. Rearrange panels as directed by Architect until layout is approved.
  - 5. Do not trim nonmodular-size units to less than modular size until after Architect's approval of layout, unless otherwise approved by Architect.

6. Mark backs of units and Shop Drawings with sequence numbers based on approved layout. Mark backs of units to indicate orientation of units in completed Work.
- B. Nominal Thickness: G.C. to field verify existing slabs.
- C. Control depth of stone to maintain minimum clearances of **3/4 inch (20 mm)** between backs of panels and structural members, fireproofing if any, backup walls, and other work behind stone. Do not back check stone less than 1 inch (25 mm) thick.
- D. Cut stone to produce uniform joints 1/8 inch (3 mm) wide and in locations indicated.
- E. Quirk-miter corners unless otherwise indicated. Fabricate for anchorage in top and bottom bed joints of corner units.
- F. Pattern Arrangement: Fabricate and arrange panels with veining and other natural markings to comply with the following requirements:
  1. Arrange panels with veining vertically.
  2. Arrange panels in blend pattern.
  3. Slip match units in each course. No matching is required between successive courses.

## 2.7 MIXES

- A. Spotting Plaster: Stiff mix of molding plaster and water.
- B. Mortar, Cement: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
  1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not use calcium chloride.
  2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.
- C. Setting Mortar: Comply with ASTM C270, Proportion Specification.
  1. Type: Type N.
  2. Mix Proportions: 1 part portland cement and 2-1/2 to 4 parts lime with aggregate ratio of 2-1/4 to 3 times the volume of cement and lime.
- D. Pointing Mortar: Comply with ASTM C270, Proportion Specification, for mortar types indicated. Provide pointing mortar mixed to match Architect's sample and complying with the following:

1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
  2. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.
  3. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with portland cement of selected color.
  4. Type: Type O.
  5. Mix Proportions: 1 part portland cement and 2-1/2 to 4 parts lime with aggregate ratio of 2-1/4 to 3 times the volume of cement and lime.
- E. Grout: Comply with mixing requirements of referenced ANSI standards and with manufacturer's written instructions.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine surfaces to receive stone paneling and conditions under which stone paneling will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone paneling.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone paneling.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION OF STONE, GENERAL**

- A. Before setting stone, clean surfaces that are dirty or stained by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.
- B. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight and true, with edges eased slightly to prevent snipping.
- C. Contiguous Work: Provide reveals and openings as required to accommodate contiguous work.
- D. Set stone to comply with requirements indicated. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
- E. Erect stone units level, plumb, and true with uniform joint widths. Use temporary shims to maintain joint width.

- F. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
  - 1. Sealing of expansion and other joints is specified in Section 079200 "Joint Sealants."
  - 2. Keep expansion joints free of plaster, mortar, grout, and other rigid materials.

### 3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/8 inch in 96 inches (3 mm in 2400 mm), 1/4 inch (6 mm) maximum.
- B. Variation from Level: For lintels, sills, chair rails, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), 3/8 inch (10 mm) maximum.
- C. Variation of Linear Building Line: For position shown in plan and related portion of walls and partitions, do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), 3/8 inch (10 mm) maximum.
- D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus 1/8 inch (3 mm).
- E. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/16 inch (1.5 mm) or one-fourth of nominal joint width, whichever is less.
- F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/32-inch (0.8-mm) difference between planes of adjacent units.

### 3.4 INSTALLATION OF STONE FACING

- A. Set units firmly against setting spots. Locate setting spots at anchors and spaced not more than 18 inches (450 mm) apart across back of unit, but provide no fewer than one setting spot per 2 sq. ft. (0.18 sq. m) unless otherwise indicated.
  - 1. Moisture Exposure: Use portland cement mortar for setting spots where stone is applied to inside face of interior walls.
- B. Set units **on direct-mount anchoring system** with anchors securely attached to stone and to backup surfaces. Comply with anchoring recommendations in ASTM C1242.
  - 1. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with sealant for filling kerfs.
  - 2. Set stone supported on clips or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths and to prevent point loading of stone on anchors. Hold shims back from face of stone a distance at least equal to width of joint.



- C. Minimum Anchors: Provide anchors at a maximum of 24 inches (600 mm) o.c. around perimeter of stone panels with a minimum of four anchors per panel.
- D. Grout joints after setting stone.
- E. Fill joints with sealant after setting and grouting stone.

### 3.5 GROUTING JOINTS

- A. Grout stone to comply with ANSI A108.10.
  - 1. Use unsanded grout mixture for joints 1/8 inch (3 mm) and narrower.
- B. Remove temporary shims before grouting.
- C. Tool joints uniformly and smoothly with plastic tool.

### 3.6 INSTALLATION OF JOINT SEALANT

- A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants." Remove temporary shims before applying sealants.

### 3.7 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean stone paneling as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
- B. Remove and replace stone paneling of the following description:
  - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
  - 2. Defective stone paneling.
  - 3. Defective joints, including misaligned joints.
  - 4. Stone paneling and joints not matching approved Samples and mockups.
  - 5. Stone paneling not complying with other requirements indicated.
- C. Replace in a manner that results in stone paneling that matches approved Samples and mockups, complies with other requirements, and shows no evidence of replacement..
- D. Clean stone paneling no fewer than six days after completion of grouting and pointing, using clean water and soft rags or stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.
- E. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions and recommendations.

**3.8 PROTECTION**

- A. Protect stone surfaces, edges, and corners from construction damage. Use securely fastened untreated wood, plywood, or heavy cardboard to prevent damage.
- B. Before inspection for Substantial Completion, remove protective coverings and clean surfaces.

**END OF SECTION 09 7513**

**SECTION 09 9100 – INTERIOR PAINTING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following substrates:

- 1. Gypsum board walls.
- 2. Gypsum board soffits and bulkheads.
- 3. Hollow metal door frames.

- B. Relater Requirements:

- 1. Section 08 1123 "Hollow Metal Frames".
- 2. Section 09 2900 "Gypsum Board Assemblies".

- C. Do not paint pre-finished items, concealed surfaces, operating parts and labels.

- 1. Pre-Finished items include the following factory-finished components:

- a. Architectural woodwork.
- b. Finished mechanical and electrical equipment.
- c. Light fixtures.

- 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

- a. Furred areas.
- b. Ceiling plenums.
- c. Pipe spaces.

- 3. Finished metal surfaces include the following:

- a. Anodized aluminum.
- b. Stainless steel.
- c. Chromium plate.
- d. Copper and copper alloys.
- e. Bronze and brass.

- 4. Operating parts include moving parts of operating equipment and the following:

- a. Valve and damper operators.
- b. Linkages.
- c. Sensing devices.
- d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG or other code-required labels or equipment name, identification, performance rating or nomenclature plates.

### 1.3 SUBMITTALS

- A. Product Data: For each product indicated, including fillers and primers.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
  1. Submit two (2) samples on rigid backing, 8 inches (200 mm) square.
  2. Step coats on Samples to show each coat required for system.
  3. Label each coat of each Sample.
  4. Label each Sample using Architect's numbering system indicated on the drawings.
- C. Product List: For each product indicated, include the following:
  1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project site in manufacturer's original, unopened packages and containers bearing the manufacturer's name and label and the following information:
  1. Product name and title of material.
  2. Product description (generic classification or binder type).
  3. Manufacturer's stock number and date of manufacture.
  4. Contents by volume, for pigment and vehicle constituents.
  5. Thinning instructions.
  6. Application instructions.
  7. Color name and number.
  8. VOC content.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.
  3. Protect from freezing.

### 1.5 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
  - 1. Quantity: Furnish 1 gal. (3.8 L) of each material and color applied.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Benjamin Moore.
  - 2. Duron Paints and Wallcoverings.
  - 3. ICI Dulux Paints.
  - 4. Pratt and Lambert Paints.
  - 5. PPG Industries, Inc.
  - 6. Sherwin-Williams.

2.2 PAINT, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
  - 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
  - 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
  - 3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
  - 4. Shellacs, Clear: VOC not more than 730 g/L.
  - 5. Shellacs, Pigmented: VOC not more than 550 g/L.
- C. Colors: As indicated in the Finish Schedule on the Drawings.

2.3 INTERIOR PAINT SYSTEMS

- A. Gypsum Board Walls, Latex:
  - 1. One Coat Interior Water-Based Primer.
  - 2. Two Coats Eggshell Latex Enamel, as indicated.

- B. Gypsum Board Walls, Epoxy (Toilet):
  - 1. One Coat Water-Based Primer Sealer.
  - 2. Two Coats Waterborne Epoxy Semi-Gloss Coating.
- C. Gypsum Board Ceilings and Bulkheads, Latex:
  - 1. One Coat Interior Water-Based Primer.
  - 2. Two Coats Latex Flat Interior Wall Paint.
- D. Hollow Metal Frames, Latex:
  - 1. One Coat Flat Interior Waterborne Primer.
  - 2. Two Coats Acrylic Latex Semi-Gloss Interior Enamel.

#### 2.4 ACCESSORY MATERIALS

- A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
  - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

#### 3.2 PREPARATION

- A. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
  2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- C. Galvanized-Metal Substrates: All galvanized metal substrates to receive field-applied paint shall be factory prime painted.
- D. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
1. Mechanical Work:
    - a. Uninsulated metal piping.
    - b. Uninsulated plastic piping.
    - c. Pipe hangers and supports.
    - d. Tanks that do not have factory-applied final finishes.
    - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
    - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
  2. Electrical Work:
    - a. Electrical equipment that is indicated to have a factory-primed finish for field painting.

- b. Exposed conduit.
- E. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- F. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- G. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- H. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

**END OF SECTION 09 9100**



**SECTION 10 1423 - PANEL SIGNAGE**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Room identification signs.
- 2. Field-applied, vinyl-character signs.

B. Related Requirements:

- 1. Section 01 5000 "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
- 2. Section 22 0553 "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
- 3. Section 23 0553 "Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
- 4. Section 26 0553 "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For panel signs.

- 1. Include fabrication and installation details and attachments to other work.
- 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
- 3. Show message list, timesteps, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

C. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

- 1. Panel Signs: Not less than 12 inches (300 mm) square, including corner.
- 2. Room-Identification Signs: Full-size Sample.
- 3. Field-Applied, Vinyl-Character Signs: Full-size Sample of characters on glass.

D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Deterioration of embedded graphic image.
    - c. Separation or delamination of sheet materials and components.
  - 2. Warranty Period: Five years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for signs.

2.2 SIGNS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. APCO Graphics, Inc.
  - 2. ASI Sign Systems, Inc.
  - 3. Best Sign Systems Inc.
  - 4. InPro Corporation.
  - 5. Supersine Company (The); Division of Stamp-Rite, Inc.
- B. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
  - 1. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to acrylic backing sheet to produce composite sheet.
    - a. Composite-Sheet Thickness: 0.25 inch (6.35 mm).
    - b. Surface-Applied Graphics: Applied vinyl film.
    - c. Colors: As selected by Architect from manufacturer's full range.

2. Surface-Applied, Raised Graphics: Applied Braille.
3. Sign-Panel Perimeter: Finish edges smooth.
  - a. Edge Condition: Square cut.
  - b. Corner Condition in Elevation: Square.
4. Mounting: Surface mounted to wall with adhesive or two-face tape.
5. Text and Typeface: Optima Medium.

### 2.3 PANEL-SIGN MATERIALS

- A. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- B. Polycarbonate Sheet: ASTM C 1349, Appendix X1, Type II (coated, mar-resistant, UV-stabilized polycarbonate), with coating on both sides.
- C. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.
- D. Paints and Coatings for Sheet Materials: Inks, dyes and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

### 2.4 ACCESSORIES

- A. Fasteners and Hangers: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
  1. Inserts: Furnish inserts to be set by other trades into concrete or masonry work.
- B. Adhesives: As recommended by sign manufacturer and with a VOC content of 70 g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

### 2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.

3. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

## 2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
  1. Install signs level, plumb, true to line and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  2. Install signs so they do not protrude or obstruct according to the accessibility standard.
  3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Room-Identification Signs: Install in locations on walls as indicated and according to accessibility standard.
- C. Mounting Methods:
  1. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

- 2. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
- D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

**3.3 ADJUSTING AND CLEANING**

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

**END OF SECTION 10 1423**



**SECTION 10 2800 – TOILET AND BATH ACCESSORIES**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes:
  - 1. Toilet accessories.
  - 2. Electric hand dryers.
  - 3. Custodial accessories.

1.2 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles and finishes.
  - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Include electrical characteristics.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.5 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, visible silver spoilage defects.
  - 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Structural Performance: Design accessories and fasteners to comply with the following requirements:
  - 1. Grab Bars: Installed units are able to resist 250 lbf (1112 N) concentrated load applied in any direction and at any point.

2.2 TOILET ACCESSORIES

- A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Bobrick Washroom Equipment.
  - 2. Bradley Corporation.'
  - 3. ASI.
- C. Toilet Tissue (Roll) Holder (TTH):
  - 1. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
  - 2. Mounting: Surface mounted.
  - 3. Operation: Noncontrol delivery with theft-resistant spindle.
  - 4. Capacity: Designed for 5-1/4-inch- diameter tissue rolls.
  - 5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- D. Paper Towel (Folded) Dispenser: (PT)
  - 1. Mounting: Surface mounted.
  - 2. Minimum Capacity: 400 C-fold or 525 multifold towels.
  - 3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  - 4. Lockset: Tumbler type.
  - 5. Refill Indicator: Pierced slots at sides or front.
- E. Liquid-Soap Dispenser (SD): **Provided & Installed by Owner.**
  - 1. Description: Designed for dispensing antibacterial soap in liquid or lotion form.
  - 2. Mounting: Vertically oriented, surface mounted.
  - 3. Capacity: 40 oz.
  - 4. Materials: Stainless steel, No. 4 finish (satin) with corrosion-resistant valve.
  - 5. Lockset: Tumbler type.
  - 6. Refill Indicator: Window type.
- F. Grab Bar (GBxx):
  - 1. Mounting: Flanges with concealed fasteners.



2. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
    - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
  3. Outside Diameter: 1-1/2 inches (38 mm).
  4. Configuration and Length: As indicated on Drawings.
- G. Sanitary-Napkin Disposal Unit (ND):
1. Mounting: Surface mounted.
  2. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
  3. Receptacle: Removable.
  4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- H. Toilet Seat-Cover Dispenser (TSC):
1. Mounting: Surface mounted.
  2. Minimum Capacity: 250 seat covers.
  3. Exposed Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  4. Lockset: Tumbler type.
- I. Mirror Unit (MI):
1. Frame: Stainless steel channel.
    - a. Corners: Mitered and mechanically interlocked.
  2. Size: As indicated on Drawings.
  3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
    - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
- J. Coat Hook (CH):
1. Description: Single-prong unit.
  2. Mounting: Concealed.
  3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- K. Electric Hand Dryer (HD):
1. Source Limitations: Obtain warm-air dryers from single source from single manufacturer.
  2. Warm-Air Dryer:
    - a. Description: Standard-speed, warm-air hand dryer.
    - b. Mounting: Surface mounted.
      - 1) Protrusion Limit: Installed unit protrudes maximum 4 inches (102 mm) from wall surface.
    - c. Operation: Electronic sensor activated with timed power cut-off switch.

1) Automatic Shutoff: At 90 seconds.

- d. Cover Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- e. Electrical Requirements: 208 to 240 V, 9 to 10 A, 1900 to 2300 W.

### 2.3 CHILDCARE ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. American Specialties, Inc.
  - 2. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
  - 3. Koala Kare Products; a division of Bobrick Washroom Equipment, Inc.

### 2.4 UNDERLAVATORY GUARDS

- A. Underlavatory Guard:
  - 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
  - 2. Material and Finish: Antimicrobial, molded plastic, white.

### 2.5 CUSTODIAL ACCESSORIES

- A. Custodial Mop and Broom Holder:
  - 1. Description: Unit with shelf, hooks, holders and rod suspended beneath shelf.
  - 2. Length: 36 inches (914 mm).
  - 3. Hooks: Four.
  - 4. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
  - 5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
    - a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
    - b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

### 2.6 MATERIALS

- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- (0.8-mm-) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.
- C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- (0.9-mm-) minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 (Z180) hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.
- G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

## 2.7 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## **PART 3 - EXECUTION**

### 3.1 INSTALLATION

- A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
  - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

## **END OF SECTION 10 2800**



**SECTION 10 4415 - FIRE-PROTECTION SPECIALTIES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Portable fire extinguishers.
  - 2. Fire-protection cabinets for portable fire extinguishers.

**1.3 SUBMITTALS**

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
  - 1. Fire Extinguishers: Include rating and classification.
  - 2. Fire-Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style and panel style.

**1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

**1.5 COORDINATION**

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

**1.6 FIRE EXTINGUISHER CERTIFICATION**

- A. General: All fire extinguishers shall be inspected and tagged by a certified agency acceptable to authorities having jurisdiction. This certification is required of all fire extinguishers and shall be conducted at a time that will not delay the date of Substantial Completion.

1. Upon certification of each fire extinguisher, the manufacturer's tag shall be removed and a new tag installed.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. JL Industries, Inc.
  2. Larsen's Manufacturing Company.
  3. Potter Roemer; Div. of Smith Industries, Inc.

### **2.2 MATERIALS**

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304.
- C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).
- D. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

### **2.3 FIRE EXTINGUISHERS**

- A. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
  1. Valves: Manufacturer's standard.
  2. Handles and Levers: Stainless steel.
  3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

### **2.4 FIRE-PROTECTION CABINET**

- A. Cabinet Type (FEC & FEHC): Suitable for fire extinguisher and fire extinguisher and hose valve.
- B. Cabinet Construction: Nonrated, unless installed in fire-rated construction.
  1. Fire Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch (1.1-mm) thick, cold-rolled steel sheet lined with minimum 5/8-inch (16-mm) thick, fire barrier material. Provide factory drilled mounting holes.

- C. Cabinet Material: Enameled-steel sheet.
- D. Semi-recessed Cabinet: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
  - 1. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.
- E. Cabinet Trim Material: Same material and finish as door.
- F. Door Material: Stainless-steel sheet.
- G. Door Style: Vertical duo panel with frame.
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
  - 1. Provide projecting lever handle with cam-action latch.
  - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- J. Accessories:
  - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
  - 2. Door Lock: Cylinder lock, keyed alike to other cabinets.
  - 3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated below.
    - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
      - 1) Location: Applied to cabinet glazing.
      - 2) Application Process: Pressure-sensitive vinyl letters.
      - 3) Lettering Color: Red.
      - 4) Orientation: Vertical.
- K. Finishes:
  - 1. Interior of cabinet.
    - a. Baked enamel.
    - b. Color and Texture: White.
  - 2. Door and Frame:
    - a. Stainless Steel: No. 4 finish.

**2.5 FABRICATION**

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
  - 1. Weld joints and grind smooth.
    - a. Provide factory-drilled mounting holes.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
  - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
  - 2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

**2.6 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

**2.7 STEEL FINISHES**

- A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
- B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

**2.8 STAINLESS-STEEL FINISHES**

- A. General: Remove tool and die marks and stretch lines or blend into finish.
  - 1. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.



- B. Satin, Directional Polish: No. 4 finish.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine roughing-in for hose and cabinets to verify actual locations of piping connections before cabinet installation.
- B. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

**3.3 INSTALLATION**

- A. General: Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights indicated below.
  - 1. Fire-Protection Cabinets: 54 inches (1372 mm) above finished floor to top of cabinet.
  - 2. Mounting Brackets: 48 inches (1219 mm) above finished floor to top of fire extinguisher.
- B. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
  - 1. Provide inside latch and lock for break-glass panels.
  - 2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Identification:
  - 1. Cabinet: Apply vinyl lettering at locations indicated.

**3.4 ADJUSTING AND CLEANING**

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

- D. Touch up marred finishes or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet manufacturer.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION 10 4415**

**SECTION 12 2113 - HORIZONTAL LOUVER BLINDS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Horizontal louver blinds, aluminum slats.

**1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.
- C. Samples for Verification: For each type and color of horizontal louver blind indicated.
  - 1. Slat: Not less than 12 inches (300 mm) long.
  - 2. Tapes: Full width, not less than 6 inches (150 mm) long.
  - 3. Valance: Full-size unit, not less than 12 inches (300 mm) wide.
- D. Product Schedule: For horizontal louver blinds. Provide at all perimeter windows in exterior walls and hollow metal storefront glazing.

**1.3 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

**1.5 FIELD CONDITIONS**

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

**PART 2 - PRODUCTS**

2.1 SOURCE LIMITATIONS

- A. Obtain horizontal louver blinds from single source from single manufacturer.

2.2 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

- A. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.

- 1. Width: 1 inch (25 mm).
- 2. Thickness: Manufacturer's standard.
- 3. Spacing: Manufacturer's standard.
- 4. Finish: Ionized antistatic, dust-repellent, baked polyester finish.

- B. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides.

- 1. Capacity: One blind per headrail unless otherwise indicated.
- 2. Ends: Capped or plugged.
- 3. Manual Lift Mechanism:
  - a. Cordless lift with balanced spring motor.
- 4. Manual Tilt Mechanism:
  - a. Tilt:
    - 1) Full.
    - 2) Two-direction, positive stop or lockout limited at an angle of 60 degrees from horizontal, both directions.
  - b. Operator: Clear-plastic wand.

- C. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic- or metal-capped ends.

- D. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.

- 1. Type: Cloth tape, manufacturer's standard width.

- E. Valance: Manufacturer's standard.

- F. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.

- 1. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.

- G. Colors, Textures, Patterns, and Gloss:

- 1. Slats: As selected by Architect from manufacturer's full range.
- 2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

**2.3 HORIZONTAL LOUVER BLIND FABRICATION**

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for cordless, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
  - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch (6 mm) per side or 1/2 inch (13 mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
  - 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- F. Color-Coated Finish:
  - 1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings and aligned with adjacent units according to manufacturer's written instructions.
  - 1. Locate so exterior slat edges are not closer than 1 inch (25 mm) from interior faces of glass and not closer than 1/2 inch (13 mm) from interior faces of glazing frames through full operating ranges of blinds.
  - 2. Install mounting and intermediate brackets to prevent deflection of headrails.

3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

**3.3 ADJUSTING**

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

**3.4 CLEANING AND PROTECTION**

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

**END OF SECTION 12 2113**

**SECTION 12 2413 - ROLLER WINDOW SHADES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Manually operated, opaque window shades.

**B. Related Requirements:**

1. Section 06 1000 "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
2. Section 07 9200 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.
3. Section 12 2113 "Horizontal Louver Blinds" for window blinds.

**1.2 ACTION SUBMITTALS**

**A. Product Data:** For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes and operating instructions for roller shades.

**B. Shop Drawings:** Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers and their relationship to adjacent work.

**C. Samples for Verification:** For each type of roller shade.

1. Shadeband Material: Not less than 10 inches (250 mm) square. Mark interior face of material if applicable.
2. Installation Accessories: Full-size unit, not less than 10 inches (250 mm) long.

**D. Product Schedule:** For roller shades. Use same room designations as indicated on the drawings.

**1.3 CLOSEOUT SUBMITTALS**

**A. Operation and Maintenance Data:** For roller shades to include in maintenance manuals; methods for maintaining roller shades, precautions regarding cleaning materials and methods and instructions for operation hardware.

**1.4 QUALITY ASSURANCE**

**A. Manufacturer Qualifications:** Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in the section.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Do not deliver roller shades until construction within spaces where shades will be installed is substantially complete.
- B. Deliver and store products in manufacturer's original, unopened, undamaged containers with labels intact.

**1.6 FIELD CONDITIONS**

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

**1.7 WARRANTY**

- A. Hardware and Shade fabric: 25 years from the date of Substantial Completion.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Basis of Design: Roller window shades are based on Lightbloc Manual Flexshades as manufactured by Draper, Inc. Subject to compliance with requirements, provide the named products or comparable products by one of the following:
  - 1. Hunter Douglas Contract.
  - 2. MechoShade Systems, Inc.

**2.2 MANUALLY OPERATED, SINGLE-ROLLER SHADES**

- A. Operation Type: Bead and chain clutch operated, vertical roll-up, fabric, opaque window shade system, complete with headbox, side and sill channels for total opacity.
- B. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
  - 1. Clutch Mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester.
    - a. Bead Chain Loop: As selected by the Architect from manufacturer's full range.
    - b. Bead Chain Hold Down: Spring-loaded tensioner complying with ANSI/WCMA A100, 1-2022 safety standard.



2. Idler Assembly: Provide roller idler assembly of molded nylon with adjustable length idler pin to facilitate easy installation and removal of shade for service.
- C. Roller Tube: Fabricated from extruded aluminum, galvanized steel or enameled steel. Diameter, wall thickness and material shall be selected by the manufacturer to accommodate shade type and size.
- D. Headbox: Extruded aluminum sections with endcaps and opacity plates.
  1. Size: 4-1/8 inches (105 mm) high by 3-1/2 inches (89 mm) wide by length required for shade being provided.
- E. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall or jamb. Provide size compatible with roller size.
- F. Side Channels: Double chamber fabricated from 0.06 inch (1.5 mm) thick extruded aluminum.

### 2.3 MATERIALS

- A. Room Darkening Fabric: SubBloc Series SB9000, manufacturer's standard close woven fiberglass base textile with sun-resistant vinyl film bonded to each side, opaque.
  1. Fire Rating: NFPA 701, 1006-Test 1.
  2. Environmental Benefits: Certified to GREENGUARD and GREENGUARD Gold standards for low chemical emissions into indoor air.
  3. Bacterial and Fungal Resistance: ASTM E2180, ASTM G21.
  4. Washable and stain resistant.
  5. Opaque, 0.015 inches thick, 12 oz./square yard.
  6. Color and Pattern: As selected by the Architect from manufacturer's full range.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb and aligned with adjacent units according to manufacturer's written instructions.
- B. Roller Shade Locations: As indicated on Drawings.

**3.3 ADJUSTING**

- A. Adjust and balance roller shades to operate smoothly, easily, safely and free from binding or malfunction throughout entire operational range.

**3.4 CLEANING AND PROTECTION**

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

**END OF SECTION 12 2413**

**SECTION 12 3661 - SIMULATED STONE COUNTERTOPS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Quartz agglomerate countertops.

- B. Related Sections:

- 1. Section 06 4116 "Plastic-Laminate-Faced Architectural Cabinets" for laminate-clad cabinets.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.

- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

- C. Samples for Verification: For the following products:

- 1. Countertop material, 6 inches (150 mm) square.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.5 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

**PART 2 - PRODUCTS**

**2.1 COUNTERTOPS**

- A. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with manufacturer's written instructions for adhesives, sealers, fabrication and finishing.
  - 1. Fabricate with loose backsplashes for field assembly.

**2.2 QUARTZ AGGLOMERATE MATERIALS**

- A. Quartz Countertop QZ1:
  - 1. Basis of Design: Quartz agglomerate is based on Viatera as manufactured by LX Hausys. Subject to compliance with requirements, provide the named products or comparable products by one of the following:
    - a. Corian Quartz.
    - b. Hanstone Quartz.
    - c. Silestone.
    - d. Daltile Quartz.
  - 2. Configuration: Provide countertops with the following front and backsplash style:
    - a. Fronts and Sides: Waterfall edge.
  - 3. Countertops: 3/4-inch- (2-cm) thick, quartz agglomerate with front edge built up with same material.
  - 4. Backsplashes: 3/4-inch- (2-cm) thick, quartz agglomerate material.
  - 5. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
  - 6. Colors: As indicated in the Finish Schedule on the drawings.
- B. Quartz Countertop Type QZ2:
  - 1. Basis of Design: Quartz agglomerate is based on Premium Natural Quartz manufactured by MSI Surfaces. Subject to compliance with requirements, provide the named products or comparable products by one of the following:
    - a. Corian Quartz.
    - b. Hanstone Quartz.
    - c. Silestone.
    - d. LX Hausys.
  - 2. Configuration: Provide countertops with the following front and backsplash style:
    - a. Fronts and Sides: Waterfall edge.

3. Countertops: 3/4-inch- (2-cm) thick, quartz agglomerate with front edge built up with same material.
4. Backsplashes: 3/4-inch- (2-cm) thick, quartz agglomerate material.
5. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
6. Colors: As selected by the Architect from manufacturer's full range.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m).
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

**END OF SECTION 12 3661**



**SECTION 21 0500 - BASIC FIRE PROTECTION MATERIALS AND METHODS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Fire Protection demolition.

**1.3 DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

**1.4 COORDINATION**

- A. Coordination Drawings: Contractor shall prepare plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ductwork, sprinkler pipework, hydronic pipework, ceiling components, Structural members, Lighting fixtures, Air outlets and inlets, Speakers, Sprinklers, fire alarm devices, and any other item that may restrict or limit the installation of the system.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify that utilities to the work area have been disconnected and capped before starting demolition operations. The systems to the remaining adjacent areas shall remain operational at all times. Shutdowns of adjacent occupied space utilities will be scheduled in advance.
- B. Review Project Record Documents and verify documents are reasonable accurate to the actual site conditions. Notify Engineer of any different conditions.
- C. Verify routing of all existing system within the work area. Determine the points of demolition of all systems. Review the points of demolition with the engineer.
- D. Determine what systems will have to be reconnected for the building to remain operational. Review the systems with the Engineer prior to proceeding with demolition.
- E. Inventory all items to be removed and salvaged.

**3.2 FIRE PROTECTION DEMOLITION**

- A. Refer to Division 01 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove fire protection systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same piping material.
  - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
  - 6. Pipes that have to be extended or reconnected: Extend or reconnect pipes with same materials.

**END OF SECTION 21 0500**



**SECTION 21 1313 - WET-PIPE SPRINKLER SYSTEMS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

**1.2 SUMMARY**

- A. This section specifies: automatic sprinkler systems for buildings and structures. Materials and equipment specified in this section include:
  - 1. Pipe, fittings, valves, and specialties.
  - 2. Sprinklers and accessories.
- B. Definitions:
  - 1. Pipe sizes: used in this specification are Nominal Pipe Size (NPS).
  - 2. Other definitions: for fire protection systems are listed in NFPA Standard 13.
  - 3. Working plans: as used in this section means those documents (including drawings and hydraulic calculations) prepared pursuant to the requirements contained in NFPA 13 and 24 for obtaining approval of the authority having jurisdiction.
- C. System Description:
  - 1. The fire protection system: shall be a "wet pipe" automatic sprinkler system. The system shall be complete with all necessary accessories and equipment, and be ready for operation.
  - 2. The "Wet-Pipe" system: shall employ automatic sprinklers attached to a piping system containing water and connected to a water supply so that water discharges immediately from sprinklers opened by fire.

**1.3 ACTION SUBMITTAL**

- A. Product data: shall be submitted in one package and shall include the following:
  - 1. Piping (including fittings, pipe hangers, and supports).
  - 2. Automatic sprinklers (including escutcheons).
- B. Shop drawings: shall be prepared in accordance with NFPA 13 and 24 identified as "Working Plans", including hydraulic calculations. Shop drawings shall be submitted to the authority having jurisdiction for approval. The contractor is responsible for all shop drawing and field coordination with all other trades. All shop drawing coordination with other trades shall be incorporated into the sprinkler shop drawings. All field variances occurring during construction shall be included on the record drawings.
- C. Record Drawings: The Contractor shall provide one set of reproducible plans that shall be "Record Drawings" which include all field variances. These plans shall be the same scale and size as the

approved plans submitted by the engineer. In the event of significant changes in the field, a record set of hydraulic calculations that include any modifications shall be included with the record drawings.

- D. Maintenance data: For each type sprinkler head, piping specialty shall be included in the operating and maintenance manual.
- E. Test reports and certificate: including "Contractor's Material & Test Certificate for Aboveground Piping."
- F. Coordination Drawings: Contractor shall prepare plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ductwork, sprinkler pipework, hydronic pipework, ceiling components, Structural members, Lighting fixtures, Air outlets and inlets, Speakers, Sprinklers, fire alarm devices, and any other item that may restrict or limit the installation of the system.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: The design and installation of the fire protection system shall comply with the requirements of the following codes:
  - 1. The North Carolina State Fire Prevention Code.
  - 2. NFPA Standards: 13, 24, 72 and 101.
  - 3. Wake County Fire Services requirements and standards.
- B. Approvals: The system design and installation shall be approved by the local authority having jurisdiction.
- C. UL Compliance: Fire protection system materials, components, and fire stops shall be Underwriters' Laboratories listed and labeled.
- D. Applicable Publications: The standards listed below form a part of this specification to the extent referenced. The standards are referenced in the text by the basic designation.
- E. National Fire Protection Association (NFPA):
  - 1. 13-2002 Standard for the Installation of Sprinkler Systems.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Grooved Mechanical Couplings:
  - 1. Sprink, Inc.
  - 2. Stockham.
  - 3. Victaulic Company of America.

- B. Sprinkler Heads:
  - 1. Grinnell Fire Protection Co., Inc.
  - 2. Reliable Automatic Sprinkler Co., Inc.
  - 3. Star Sprinkler Corp.
  - 4. Viking Corp.

## 2.2 PIPE AND FITTINGS

- A. General: Refer to the Execution section, Article "Pipe Applications" for identification of systems where the below specified pipe and fitting materials are used. Pipe shall be new, designed to withstand the working pressures involved, but not less than 175 psi. Pipe shall have the manufacturer's name or brands, along with the applicable ASTM standard, marked on each length of pipe.
- B. Black steel pipe shall be Schedule 40, Schedule 10, or other material UL listed for fire protection use and as called for on the plans.
- C. Cast-iron threaded fittings shall be ANSI B16.4, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.
- D. Malleable-iron threaded fittings shall be ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.
- E. Grooved mechanical fittings shall be ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47 Grade 32510 malleable iron; or ASTM A53, Type F or Types E or S, Grade B fabricated steel fittings with grooves or shoulders designed to accept grooved end couplings.
- F. Grooved mechanical couplings shall consist of ductile or malleable iron; housing, a synthetic rubber gasket or a central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or logs to secure roll-grooved pipe and fittings. Grooved mechanical couplings including gaskets used on dry-pipe systems shall be listed for dry-pipe service.
- G. Gasket materials: Thickness, material, and type suitable for fluid or gas to be handled, and design temperatures and pressures.
- H. Pipe hangers shall be as specified in Section 6-1 and 6-2 of NFPA 13.

## 2.3 AUTOMATIC SPRINKLERS

- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- B. Pressure Rating for Automatic Sprinklers: 175-psig (1200-kPa) minimum.
- C. Sprinkler Finishes: Chrome plated.
- D. Sprinkler heads shall be equal in construction, performance and listing to those shown on the plans.
- E. Sprinkler escutcheons shall be all metal type with finish to match sprinkler.

2.4 ALARM DEVICES

- A. General: Types and sizes shall mate and match piping and equipment connections.

**PART 3 - EXECUTION**

3.1 PIPE APPLICATIONS

- A. Wet-Pipe System: Install schedule 40 black steel pipe with threaded joints and fittings for 2 inch and smaller. Schedule 10 steel pipe with roll- grooved ends and grooved mechanical couplings shall be used for 2 1/2 inch and larger. No other joints or fittings will be acceptable.

3.2 PIPING INSTALLATIONS

- A. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. So far as practical, install piping as indicated.
- B. Install all piping at right angles or parallel to building walls. Diagonal runs are prohibited. All piping shall be installed plumb, level, square, and parallel to the building walls.
- C. Other than minor deviations from approved "Working Plans" for sprinkler piping require written approval of the engineer. Written approval shall be on file with the Architect prior to deviating from the approved "Working Plans."
- D. Install sprinkler piping to provide for system drainage in accordance with NFPA 13.
- E. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- F. Hangers and Supports: Comply with the requirements of NFPA 13 and NFPA 16A. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems.

3.3 PIPE JOINT CONSTRUCTION

- A. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:
  - 1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
  - 2. Align threads at point of assembly.
  - 3. Apply appropriate tape or thread compound to the external pipe threads.
  - 4. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.
- B. Damaged Threads: Do not use a pipe with threads which are corroded or damaged. If a weld pens during cutting or threading operations, that portion of pipe shall not be used.
- C. Mechanical Grooved Joints: Cut or roll grooves on pipe ends dimensionally compatible with the couplings.

- D. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

**3.4 SPRINKLER HEAD INSTALLATIONS**

- A. Install sprinklers in center of lay-in ceiling tile by means of "return bends." Use proper tools to prevent damage during installation.

**3.5 FIELD QUALITY CONTROL**

- A. Flush, test, and inspect sprinkler piping systems in accordance with NFPA 13 and 24.
- B. Replace piping system components which do not pass the test procedures specified, and retest repaired portion of the system.

**END OF SECTION 21 1313**



**SECTION 22 0500 - BASIC PLUMBING MATERIALS AND METHODS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Sleeves.
  - 3. Escutcheons.
  - 4. Equipment installation requirements common to equipment sections.
  - 5. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.
- C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

1.4 COORDINATION

- A. Coordination Drawings: Contractor shall prepare plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ductwork, sprinkler pipework, hydronic pipework, ceiling components, Structural members, Lighting fixtures, Air outlets and inlets, Speakers, Sprinklers, fire alarm devices, and any other item that may restrict or limit the installation of the system.

**PART 2 - PRODUCTS**

2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

## 2.2 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

## 2.3 SLEEVES

- A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

## 2.4 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

## **PART 3 - EXECUTION**

### 3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping shall be at right angles or parallel to building walls. Diagonal runs are prohibited. All piping shall be installed plumb, level, square, and parallel to the building. Piping shall be routed high as possible.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.



- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections. 90 degree angle only.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Verify final equipment locations for roughing-in.
- O. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

### 3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.

**3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGES**

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

**3.5 PLUMBING DEMOLITION**

- A. Refer to Division 01 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same piping material. Copper pipe shall be soldered.
  - 2. Piping Caps or Plugs: Shall match the remaining piping with same piping material. Copper pipe shall be soldered. Shark-bite type fitting and Press type fittings are not acceptable.
  - 3. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same piping material. Piping cannot be abandoned in place without permission from the owner and engineer.
  - 4. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 5. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - 6. Pipes that have to be extended or reconnected: Extend or reconnect pipes with same materials.
- C. If insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

**END OF SECTION 22 0500**

**SECTION 22 0523 - PLUMBING VALVES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following general-duty valves:
  - 1. Copper-alloy ball valves.

1.3 SUBMITTALS

- A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; furnished specialties; and accessories.

1.4 QUALITY ASSURANCE

- A. ASME Compliance: ASME B31.9 for building services piping valves.
  - 1. Exceptions: Domestic hot- and cold-water piping valves unless referenced.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 VALVES, GENERAL

- A. Refer to Part 3 "Valve Applications" Article for applications of valves.
- B. Bronze Valves: NPS 2 (DN 50) and smaller: Threaded ends, unless otherwise indicated.

- C. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- D. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
- E. Valve Actuators:
  - 1. Handwheel: For valves other than quarter-turn types.
  - 2. Lever Handle: For quarter-turn valves NPS 6 (DN 150) and smaller, except plug valves.
- F. Extended Valve Stems: On insulated valves.

### 2.3 BALL VALVES

- A. Available Manufacturers:
  - 1. Ball Valves:
    - a. Conbraco Industries, Inc.; Apollo Div.
    - b. Crane Co.; Crane Valve Group; Jenkins Valves.
    - c. Crane Co.; Crane Valve Group; Stockham Div.
    - d. Grinnell Corporation.
    - e. NIBCO INC.
- B. Copper-Alloy Ball Valves, General: MSS SP-110.
- C. Two-Piece, Copper-Alloy Ball Valves: Brass or bronze body with full-port, chrome-plated bronze ball; PTFE seats; and 400-psig minimum CWP rating and blowout-proof stem.

## **PART 3 - EXECUTION**

### 3.1 VALVE APPLICATIONS

- A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:
  - 1. Shutoff Service: Ball valves.
  - 2. Throttling Service: Ball valves.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
- C. Domestic Water Piping: Use the following types of valves:
  - 1. Ball Valves: Two-piece, 400-psig (2760-kPa) CWP rating, copper alloy.
- D. Select valves, except wafer and flangeless types, with the following end connections:
  - 1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Solder-joint or threaded ends, except provide valves with threaded ends for heating hot water services.

**3.2 VALVE INSTALLATION**

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access and provide separate support where necessary.
- D. Install valves in horizontal piping with stem at or above center of pipe.
- E. Install valves in position to allow full stem movement.

**3.3 JOINT CONSTRUCTION**

- A. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for basic piping joint construction.

**3.4 ADJUSTING**

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

**END OF SECTION 22 0523**



**SECTION 22 0529 - HANGERS AND SUPPORTS FOR PLUMBING PIPE**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes hangers and supports for plumbing system piping and equipment.

1.3 PERFORMANCE REQUIREMENTS

- A. Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

1.4 SUBMITTALS

- A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 MANUFACTURED UNITS

- A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components.
  - 1. Available Manufacturers:
    - a. B-Line Systems, Inc.
    - b. Carpenter & Patterson, Inc.
    - c. Grinnell Corp.

- d. GS Metals Corp.
  - e. National Pipe Hanger Corp.
  - f. Piping Technology & Products, Inc.
- 2. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
  - 3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
- 1. Available Manufacturers:
    - a. B-Line Systems, Inc.
    - b. Grinnell Corp.
    - c. GS Metals Corp.
    - d. National Pipe Hanger Corp.
    - e. Thomas & Betts Corp.
    - f. Unistrut Corp.
  - 2. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
  - 3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- C. Thermal-Hanger Shield Inserts: 100-psi (690-kPa) minimum compressive-strength insulation, encased in sheet metal shield.
- 1. Available Manufacturers:
    - a. Carpenter & Patterson, Inc.
    - b. Pipe Shields, Inc.
    - c. Rilco Manufacturing Co., Inc.
    - d. Value Engineered Products, Inc.
  - 2. Material for Hot Piping: ASTM C 552, Type I cellular glass or water-repellent-treated, ASTM C 533, Type I calcium silicate.
  - 3. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
  - 4. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
  - 5. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

### 2.3 MISCELLANEOUS MATERIALS

- A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- C. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

## **PART 3 - EXECUTION**



**3.1 APPLICATIONS**

- A. Specific hanger requirements are specified in Sections specifying equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.
- C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).
- D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500).
  - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500), if longer ends are required for riser clamps.
- E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
  - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
- F. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction to attach to top flange of structural shape.
  - 2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  - 3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  - 4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  - 5. C-Clamps (MSS Type 23): For structural shapes.
  - 6. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb (340 kg).
    - b. Medium (MSS Type 32): 1500 lb (675 kg).
    - c. Heavy (MSS Type 33): 3000 lb (1350 kg).
  - 7. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  - 8. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.

2. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density, 100-psi (690-kPa) minimum compressive-strength, water-repellent-treated calcium silicate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.

### 3.2 INSTALLATION

- A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems. Field assemble and install according to manufacturer's written instructions.
- C. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes. Support pipes of various sizes together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- D. Install building attachments to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.
- E. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
- F. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.
- K. Insulated Piping: Comply with the following:
  1. Attach clamps and spacers to piping.
    - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

- b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
  - c. Do not exceed pipe stress limits according to ASME B31.9.
- 2. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
  - 3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.
  - 4. Shield Dimensions for Pipe: Not less than the following:
    - a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
    - b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
  - 5. Insert Material: Length at least as long as protective shield.
  - 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

### 3.3 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations. Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

### 3.4 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

### 3.5 PAINTING

- A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

**END OF SECTION 22 0529**



**SECTION 22 0553 – IDENTIFICATION FOR PLUMBING PIPING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

**PART 2 - PRODUCTS**

2.1 STENCILS

- A. Stencils for Piping:
  - 1. Lettering Size: Size letters according to ASME A13.1 for piping and at least 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm) and proportionately larger lettering for greater viewing distances.
  - 2. Stencil Material: Fiberboard or metal.
  - 3. Stencil Paint: Exterior, gloss, acrylic enamel in colors complying with recommendations in ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.
  - 4. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.

2.2 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4 inch (6.4 mm) letters for piping system abbreviation and 1/2 inch (13 mm) numbers, with numbering scheme. Provide 5/32 inch (4 mm) hole for fastener.
  - 1. Material: 0.032 inch (0.8 mm) thick brass.
  - 2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

**PART 3 - EXECUTION**

**3.1 APPLICATIONS, GENERAL**

- A. Products specified are for applications referenced in other Division 22 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

**3.2 PIPING IDENTIFICATION**

- A. All exposed pipe and pipes in accessible chases will be painted. Colors will be selected by Engineer.
- B. Stenciled Pipe Label: Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.
  - 1. Identification Paint: Use for contrasting background.
  - 2. Stencil Paint: Use for pipe marking.
- C. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and non-accessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
  - 7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

**3.3 VALVE-TAG INSTALLATION**

- A. Install tags on valves and control devices in piping systems.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:
  - 1. Valve-Tag Size and Shape:
    - a. Cold Water: 2 inches (50 mm), round.
    - b. Hot Water: 2 inches (50 mm), round.
  - 2. Valve-Tag Color:
    - a. Cold Water: Blue.
    - b. Hot Water: Red.

3. Letter Color:
  - a. Cold Water: White.
  - b. Hot Water: White.

**3.4 ADJUSTING AND CLEANING**

- A. Relocate identification materials and devices that have become visually blocked by other work.
- B. Clean faces of identification devices.

**END OF SECTION 22 0553**





**SECTION 22 0700 – PLUMBING PIPE INSULATION**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes semirigid and flexible piping insulation, insulating cements, field-applied jackets, accessories and attachments, and sealing compounds.

1.3 SUBMITTALS

- A. Product Data: Thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.
- B. Shop Drawings: Shop fabrication and installation details for the following:
  - 1. Application of protective shields, saddles, and inserts at pipe hangers for each type of insulation and hanger.
  - 2. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
  - 3. Removable insulation at piping specialties and equipment connections.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Mineral-Fiber Insulation:
    - a. CertainTeed Manson.
    - b. Knauf FiberGlass GmbH.
    - c. Owens-Corning Fiberglas Corp.
    - d. Schuller International, Inc.

**2.2 PIPE INSULATION MATERIALS**

- A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:
  - 1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
  - 2. Fire-Resistant Adhesive: Comply with MIL-A-3316C Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
  - 3. Vapor-Retarder Mastics: Fire and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
  - 4. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.
  - 5. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C 196.
  - 6. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
  
- B. Field-Applied Jackets: ASTM C 921, Type 1, unless otherwise indicated.
  - 1. Canvas jacket with vapor-retarder mastics.
  - 2. Pre-formed aluminum.
  
- C. Accessories and Attachments:
  - 1. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd. (270 g/sq. m).
  - 2. Bands: 3/4 inch (19 mm) wide aluminum.
  - 3. Wire: 0.080 inch (2.0 mm), nickel-copper alloy; 0.062 inch (1.6 mm), soft-annealed, stainless steel; or 0.062 inch (1.6 mm), soft-annealed, galvanized steel.

**PART 3 - EXECUTION**

**3.1 GENERAL APPLICATION REQUIREMENTS**

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
  
- B. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.
  
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
  
- D. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
  
- E. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
  
- F. Apply insulation with the least number of joints practical.

- G. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- H. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.
- I. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- J. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.
- K. Floor Penetrations: Terminate insulation at underside of floor assembly and at floor support at top of floor.

### 3.2 PIPE INSULATION APPLICATION SCHEDULE

- A. Service: Domestic cold water.
  - 1. Operating Temperature: 35 to 60 deg F (2 to 15 deg C).
  - 2. Insulation Material: Mineral-fiber preformed pipe.
  - 3. Insulation Thickness: 1".
  - 4. Vapor Retarder Required: Yes.
  - 5. Canvas jacket on exposed piping in accessible chases.
- B. Service: Domestic hot water.
  - 1. Operating Temperature: 60 to 140 deg F (15 to 60 deg C).
  - 2. Insulation Material: Mineral fiber pre-formed pipe.
  - 3. Insulation Thickness: 1".
  - 4. Field-Applied Jacket: Canvas jacket on exposed piping in accessible chases.

**END OF SECTION 22 0700**



**SECTION 22 1116 - DOMESTIC WATER PIPING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.

1.3 ACTION SUBMITTALS

- A. Product Data: For transition fittings and dielectric fittings.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

**PART 2 - PRODUCTS**

2.1 PIPING MATERIALS

- A. Transition Couplings: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- B. Hard Copper Tube: ASTM B 88, Types L and M (ASTM B 88M, Types B and C), water tube, drawn temper.
  - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2.2 VALVES

- A. Refer to Division 22 Section "Plumbing Valves" for valves.

**PART 3 - EXECUTION**

**3.1 PIPING APPLICATIONS**

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- B. Interior Domestic Water Piping: Use the following piping materials for each size range:
  - 1. NPS 2 (DN 50) and Smaller: Hard copper tube, Type L (Type B); soldered joints.

**3.2 VALVE APPLICATIONS**

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Shutoff Duty: Use bronze ball valves for piping NPS 2 (DN 50) and smaller.
  - 2. Throttling Duty: Use bronze ball valves for piping NPS 2 (DN 50) and smaller.
  - 3. Drain Duty: Hose-end drain valves.

**3.3 PIPING INSTALLATION**

- A. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for basic piping installation.
- B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each domestic water service.
- C. Install domestic water piping level and plumb.
- D. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.
- E. Perform the following steps before operation:
  - 1. Close drain valves, hydrants, and hose bibb.
  - 2. Open shutoff valves to fully open position.
  - 3. Open throttling valves to proper setting.
  - 4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
  - 5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
  - 6. Remove filter cartridges from housings, and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.
- F. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.
- G. Check plumbing specialties and verify proper settings, adjustments, and operation.

**3.4 JOINT CONSTRUCTION**

- A. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for basic piping joint construction.

- B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

### 3.5 VALVE INSTALLATION

- A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball valves for piping NPS 2 (DN 50) and smaller.
- B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball valves for piping NPS 2 (DN 50) and smaller.
- C. Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
  - 1. Install hose-end drain valves at low points in water mains, risers, and branches.
  - 2. Install stop-and-waste drain valves where indicated.

### 3.6 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 22 Section "Hangers and Supports for Plumbing Pipe" for pipe hanger and support devices. Install the following:
  - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
    - a. MSS Type 1, adjustable, steel clevis hangers.
- B. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Pipe."
- C. Support vertical piping and tubing.
- D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch (10 mm).
- E. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/4 (DN 32) and Smaller: 84 inches (2100 mm) with 3/8 inch (10 mm) rod.
  - 2. NPS 1-1/2 (DN 40): 108 inches (2700 mm) with 3/8 inch (10 mm) rod.
  - 3. NPS 2 (DN 50): 10 feet (3 m) with 3/8 inch (10 mm) rod.
- F. Install supports for vertical steel piping every 15 feet (4.5 m).
- G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 3/4 (DN 20) and smaller: 60 inches (1500 mm) with 3/8 inch (10 mm) rod.
  - 2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8 inch (10 mm) rod.
  - 3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8 inch (10 mm) rod.
- H. Install supports for vertical copper tubing every 10 feet (3 m).

- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

**3.7 CONNECTIONS**

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.

**3.8 FIELD QUALITY CONTROL**

- A. Inspect domestic water piping as follows:
  1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
  2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
    - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    - b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
  3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
  4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- B. Test domestic water piping as follows:
  1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
  2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
  3. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
  4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
  5. Prepare reports for tests and required corrective action.

**3.9 CLEANING**

- A. Clean and disinfect potable domestic water piping as follows:



1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
  - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
  - b. Fill and isolate system according to either of the following:
    - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
    - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.
  - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
  - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

**END OF SECTION 22 1116**



**SECTION 22 1119 - PLUMBING SPECIALTIES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes plumbing specialties for water distribution systems; and soil, waste, and vent systems.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.
- B. Submit product data including rated capacities of selected models and weights (shipping, installation, and operation). Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections:

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Coordinate subparagraphs retained below with subparagraph titles retained in other Part 2 articles. Refer to Division 01 Section "Product Requirements."
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
    - a. Josam Co.
    - b. Smith by Jay R. Smith Mfg. Co. Div., Smith Industries, Inc.
    - c. Watts Regulator Co.
    - d. Woodford Manufacturing Co. Div., WCM Industries, Inc.
    - e. Zurn by Hydromechanics Div., Zurn Industries, Inc.

2.2 HOSE BIBBS/HYDRANTS

- A. HB: ANSI/ASSE 1019; Concealed, all bronze interior parts, replaceable bronze seat and seat washer, self-draining type with polished bronze box face, lockable box with "T" handle key, thread hose spout, removable key, and vacuum breaker. Zurn, Z1349

**2.3 FLOOR DRAINS**

- A. FD-1: ANSI A112.21.1; lacquered cast iron two piece body with double drainage flange, weep holes, square adjustable satin stainless steel strainer.

**2.4 CLEANOUTS**

- A. Interior Finished Floor Areas: Lacquered cast-iron, two-piece body, square scoriated cover in service areas and square with depressed cover to accept floor finish in finished floor areas and satin stainless steel finish.
- B. Interior Finished Floor Traffic Areas: Lacquered cast-iron, two-piece body, square with heavy duty scoriated cover, and satin stainless steel finish.
- C. Interior Finished Wall Areas: Line type with lacquered cast iron body and flat round epoxy coated gasketed cover, and round stainless-steel access cover secured with machine screw.

**2.5 WATER HAMMER ARRESTORS**

- A. ANSI A112.26.1; sized in accordance with PDI WH-201, precharged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psig working pressure.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated.
  - 1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
  - 2. Locate at each change in direction of piping greater than 45 degrees.
  - 3. Locate at base of each vertical soil and waste stack.
- C. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.
- D. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.
- E. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
- F. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

- G. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

**3.2 CONNECTIONS**

- A. Install piping adjacent to equipment to allow service and maintenance.

**3.3 LABELING AND IDENTIFYING**

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each piece of equipment.
  - 1. Text: Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.
  - 2. Refer to Division 22 Section "Identification for Plumbing Piping" for nameplates and signs.

**3.4 PROTECTION**

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

**END OF SECTION 22 1119**



**SECTION 22 1316 - SANITARY WASTE AND VENT PIPING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes soil and waste, sanitary drainage and vent piping inside the building.

1.3 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

**PART 2 - PRODUCTS**

2.1 PIPING MATERIALS

- A. Hub-and-Spigot Cast-Iron Pipe and Fittings: ASTM A 74, Service class.
  - 1. Gaskets: ASTM C 564, rubber.
- B. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.
  - 1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral, center pipe stop.
    - a. Heavy-Duty, Type 304, Stainless-Steel Couplings: ASTM A 666, Type 304, stainless-steel shield; stainless-steel bands; and sleeve.
      - 1) NPS 1-1/2 to NPS 4 (DN 40 to DN 100): 3 inch (76 mm) wide shield with 4 bands.
      - 2) NPS 5 to NPS 10 (DN 125 to DN 250): 4 inch (102 mm) wide shield with 6 bands.

**PART 3 - EXECUTION**

3.1 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.

- B. Aboveground, Soil, Waste, and Vent Piping: Use the following piping materials for each size range:
  - 1. NPS 1-1/4 and NPS 1-1/2 (DN 32 and DN 40): Use NPS 1-1/2 (DN 40) hubless, cast-iron soil piping and one of the following:
    - a. Couplings: Heavy-duty, Type 304, stainless steel.
  - 2. NPS 2 to NPS 4 (DN 50 to DN 100): Hubless, cast-iron soil piping and one of the following:
    - a. Couplings: Heavy-duty, Type 304, stainless steel.

### 3.2 PIPING INSTALLATION

- A. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for basic piping installation.
- B. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8 bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

### 3.3 JOINT CONSTRUCTION

- A. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for basic piping joint construction.
- B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
  - 1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
  - 2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
  - 3. Install supports for vertical steel piping every 15 feet (4.5 m).
  - 4. Vertical Piping: MSS Type 8 or Type 42, clamps.
  - 5. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2 inch (13 mm) rod.
  - 6. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8 inch (16 mm) rod.
  - 7. NPS 6 (DN 150): 60 inches (1500 mm) with 3/4 inch (19 mm) rod.
  - 8. Spacing for 10 foot (3 m) lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).
    - a. MSS Type 1, adjustable, steel clevis hangers.
  - 9. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Pipe."
- D. Support vertical piping and tubing at base and at each floor.



- E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8 inch (10 mm) minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8 inch (10 mm) rod.

### 3.4 CONNECTIONS

- A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

### 3.5 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
  - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.
  - 1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
  - 2. Prepare reports for tests and required corrective action.

### 3.6 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

**END OF SECTION 22 1316**



**SECTION 22 4000 – PLUMBING FIXTURES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes plumbing fixtures and trim, fittings, and accessories, appliances, appurtenances, equipment, and supports associated with plumbing fixtures.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.
- B. Product data for each type of plumbing fixture specified, including fixture and trim, fittings, accessories, appliances, appurtenances, equipment, supports, construction details, dimensions of components, and finishes.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Acceptable manufacturers.
  - 1. Fixtures:
    - a. American Standard, Inc.
    - b. Eljer; A Household International Co.
    - c. Kohler Co.
    - d. Zurn Industries, Inc.
  - 2. Sinks:
    - a. American Standard, Inc.
    - b. Duravit.
    - c. Elkay Manufacturing Co.
    - d. Just Manufacturing Co.
    - e. Kohler Co.
  - 3. Toilet Seats:
    - a. Bemis Mfg. Co.
    - b. Kohler Co.

- c. Olsonite Corp.
    - d. Zurn Industries, Inc.
  - 4. Flushometers:
    - a. Coyne & Delany Co.
    - b. Sloan Valve Co.
    - c. Zurn Industries, Inc.; Flush Valve Operations.
  - 5. Commercial/Industrial Cast-Brass Faucets:
    - a. Armstrong Hot Water Group.
    - b. Behavioral Safety Products.
    - c. Crane Plumbing/Fiat Products.
    - d. Elkay Manufacturing Co.
    - e. Jay R. Smith Manufacturing Co.
    - f. T & S Brass and Bronze Works, Inc.
  
- 2.2 WATER CLOSET - FLUSH VALVE – FLOOR MOUNT - BACK OUTLET - I/R SENSOR – HC (P-1)
  - A. Bowl: ANSI A112.19.2; floor mounted, back outlet, siphon jet, vitreous china closet bowl, with elongated rim, 18 inches high, 1-1/2 inch spud, and china bolt caps. American Standard, Priolo or engineer approved equal.
  - B. Flush Valve: ANSI A112.19.1; exposed chrome plated, diaphragm type with battery operated sensor unit, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker. Zurn Z6000 with ZERK-CPM or engineer approved equal.
  - C. Seat: Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, without cover.
  - D. Solid white plastic, open front, extended back, less cover, complete with self-sustaining hinge.
  
- 2.3 LAVATORY – UNDER MOUNT – STAINLESS STEEL - HC - I/R SENSOR (P-2)
  - A. Lavatory: ANSI A112.19.2; stainless steel under mount lavatory, minimum 18 gauge, type 304 stainless steel, 18 x 14 x 6 inch oval inside diameter, counter drilled for trim, seal of putty, caulking, or concealed vinyl gasket. Elkay, ELUH-1511 or engineer approved equal.
  - B. Trim: ANSI A112.18-2000; infrared self-adjusting sensor, single hole mounting, single hole mounting; one six-volt lithium battery power source, mount within spout cavity with minimum 200,000 cycles life, low battery indicator integral with sensor array; removable shroud with internal temperature control; flow control .5 GPM; vandal resistant aerator; stainless supplies; polished chrome plated finish, all metal construction, 6-1/8" die-cast spout; metal trim, open grid strainer, cast brass P-trap and arm with escutcheon. Provide thermostatic mixing valve under lavatory if not already provided with faucet. T & S Brass, EC-3103 or engineer approved equal.
  - C. Insulation: Truebro lavatory guard pipe covers on P-trap and risers and angle valves.
  
- 2.4 REFRIGERATOR BOX (P-3) (EXISTING)

**2.5 MOP SINK – TERRAZZO (P-4)**

- A. Bowl: 24 x 24 x 12 inch high molded stone floor mounted, neo-corner type, with one inch wide shoulders, 3 inch drain and stainless steel strainer. Fiat FTSC6000501 or engineer approved equal
- B. Trim: ANSI A112.18.1 exposed wall type supply with lever handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges; 5 feet of 1/2 inch diameter plain end reinforced rubber hose, hose clamp, mop hanger. T & S Brass, B-0665-BSTR or engineer approved equal.

**2.6 ELECTRIC WATER COOLER – HC (EWC-1)**

- A. Fountain: ADA A117.1; handicapped self-contained wall mounted electric bottle filling station with bi-level water cooler. The features shall include hands free, lead free, visual filter monitor, light, automatic filter status reset, filtered, energy savings, laminar flow, antimicrobial, with a drain. The top shall be stainless steel top, vinyl on steel body, elevated mount with stream guard, automatic stream regulator, mounting bracket, refrigerated with integral air-cooled condenser; capacity of 8 gal/hr. of 50-degree F water with inlet at 80-degree F and room temperature of 90-degree F. Elkay model LZSTL8WSP with Cane Apron or engineer approved equal.

**2.7 ELECTRIC WATER COOLER – HC (EWC-2)**

- A. Fountain: ARI 1010; handicapped wall mounted electric water cooler with stainless steel top, vinyl on steel body, elevated mount with stream guard, automatic stream regulator, mounting bracket, refrigerated with integral air-cooled condenser; capacity of 5 gal/min of 50-degree F. water with inlet at 80-degree F and room temperature of 90-degree F. Elkay model LZS8S with Cane Apron or engineer approved equal.

**PART 3 - EXECUTION**

**3.1 INSPECTION**

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- B. Verify adjacent construction is ready to receive rough-in work of this Section.

**3.2 INSTALLATION**

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.

- E. Seal fixtures to wall and floor surfaces with sealant.
- F. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- G. For wall-hanging fixtures, install off-floor supports affixed to building substrate.
  - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
  - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
  - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- H. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.
- I. Install wall-hanging fixtures with tubular waste piping attached to supports.
- J. Install counter-mounting fixtures in and attached to casework.
- K. Install fixtures level and plumb according to manufacturers' written instructions and rough-in drawings.
- L. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping.
- M. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- N. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- O. Install toilet seats on water closets.
- P. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.
- Q. Install traps on fixture outlets.
  - 1. Exception: Omit trap on fixtures with integral traps.
- R. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for escutcheons.
- S. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

### 3.3 CONNECTIONS

- A. Connect water supplies from water distribution piping to fixtures.
- B. Connect drain piping from fixtures to drainage piping.

**3.4 PROTECTION**

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

**3.5 ADJUSTING AND CLEANING**

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.
- B. At completion clean plumbing fixtures and equipment.

**END OF SECTION 22 4000**





**SECTION 23 0500 - BASIC MECHANICAL MATERIALS AND METHODS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Sleeves.
  - 3. Escutcheons.
  - 4. Mechanical demolition.
  - 5. Equipment installation requirements common to equipment sections.
  - 6. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

1.4 QUALITY ASSURANCE

- A. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.5 COORDINATION

- A. Coordination Drawings: Contractor shall prepare plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ductwork, sprinkler pipework, hydronic pipework, ceiling components, Structural members, Lighting fixtures, Air outlets and inlets, Speakers, Sprinklers, fire alarm devices, and any other item that may restrict or limit the installation of the system.

**PART 2 - PRODUCTS**

**2.1 PIPE, TUBE, AND FITTINGS**

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.

**2.2 JOINING MATERIALS**

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

**2.3 ESCUTCHEONS**

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

**PART 3 - EXECUTION**

**3.1 DEMOLITION**

- A. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Equipment to Be Removed: Disconnect and cap services and remove equipment.
- B. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

**3.2 PIPING SYSTEMS - COMMON REQUIREMENTS**

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss,

expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

- C. Install piping in concealed locations, unless otherwise indicated.
- D. Install piping at right angles or parallel to building walls. Diagonal runs are prohibited. All piping shall be installed plumb, level, square, and parallel to the building. Piping shall be routed high as possible.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Select system components with pressure rating equal to or greater than system operating pressure.
- K. Install escutcheons for penetrations of walls, ceilings, and floors.
- L. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floors.
- M. Refer to manufacturer installation requirements for roughing-in requirements.

### 3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

### 3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to each valve and at final connection to each piece of equipment.

### 3.5 MECHANICAL DEMOLITION

- A. Refer to Division 01 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

- B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same piping material. Copper pipe shall be soldered.
  - 2. Piping Caps or Plugs: Shall match the remaining piping with same piping material. Copper pipe shall be soldered. Shark-bite type fitting and Press type fittings are not acceptable.
  - 3. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same piping material. Piping cannot be abandoned in place without permission from the owner and engineer.
  - 4. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 5. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - 6. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same ductwork material. If duct is insulated, insulate to match adjacent ductwork.
  - 7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
  - 8. Ducts to Be Abandoned in Place: Cap or plug ducts with same ductwork material.
  - 9. Ducts or Pipes that have to be extended or reconnected: Extend or reconnect ducts or pipes with same materials.
  
- C. If duct, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

**END OF SECTION 23 0500**

**SECTION 23 0518 - ESCUTCHEONS FOR HVAC PIPING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Escutcheons.

**PART 2 - PRODUCTS**

2.1 ESCUTCHEONS

- A. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
- B. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
  - 1. Escutcheons for New Piping:
    - a. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.

**END OF SECTION 23 0518**



**SECTION 23 0523 - GENERAL-DUTY VALVES FOR HVAC PIPING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

- 1. Ball valves.

**1.3 SUBMITTALS**

- A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; furnished specialties; and accessories.

**1.4 QUALITY ASSURANCE**

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
  - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
  - 2. ASME B31.1 for power piping valves.
  - 3. ASME B31.9 for building services piping valves.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Prepare valves for shipping as follows:
  - 1. Protect internal parts against rust and corrosion.
  - 2. Protect threads, flange faces, grooves, and weld ends.
  - 3. Set ball valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
  - 1. Maintain valve end protection.
  - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

**PART 2 - PRODUCTS**

**2.1 GENERAL REQUIREMENTS FOR VALVES**

- A. Refer to HVAC valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
  - 1. Handwheel: For valves other than quarter-turn types.
- E. Valves in Insulated Piping: With 2 inch (50 mm) stem extensions and the following features:
  - 1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- F. Valve-End Connections:
  - 1. Threaded: With threads according to ASME B1.20.1.
- G. Valve Bypass and Drain Connections: MSS SP-45.

**2.2 BRONZE BALL VALVES**

- A. Two-Piece or Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Conbraco Industries, Inc.; Apollo Valves.
    - b. Hammond Valve.
    - c. Milwaukee Valve Company.
    - d. NIBCO INC.
  - 2. Description:
    - a. Standard: MSS SP-110.
    - b. SWP Rating: 150 psig (1035 kPa).
    - c. CWP Rating: 600 psig (4140 kPa).
    - d. Body Design: Two or Three piece.
    - e. Body Material: Bronze.
    - f. Ends: Threaded.
    - g. Seats: PTFE or TFE.
    - h. Stem: Stainless steel.
    - i. Ball: Stainless steel, vented.
    - j. Port: Full.



**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

**3.2 VALVE INSTALLATION**

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.

**3.3 ADJUSTING**

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

**3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS**

- A. Hot-Water Piping: Use the following types of valves:
  - 1. Ball Valves, NPS 2 (DN 50) and Smaller: Two-piece, 400-psig (2760-kPa) CWP rating, copper alloy.
- B. Select valves, except wafer and flangeless types, with the following end connections:
  - 1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends.
  - 2. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.

**END OF SECTION 23 0523**



**SECTION 23 0529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Metal pipe hangers and supports.
  - 2. Trapeze pipe hangers.
  - 3. Thermal-hanger shield inserts.
  - 4. Equipment supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

**PART 2 - PRODUCTS**

2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
  - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
  - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
  - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
  - 4. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of steel.

2.2 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

- A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.
- B. Insulation-Insert Material for Hot Piping: ATM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.6 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

**PART 3 - EXECUTION**

**3.1 HANGER AND SUPPORT INSTALLATION**

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
  - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
  - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:
  - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
  - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- G. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- H. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- K. Insulated Piping:
  - 1. Attach clamps and spacers to piping.

- a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
  - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
  - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
  3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
  4. Shield Dimensions for Pipe: Not less than the following:
    - a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
    - b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
  5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

### 3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

### 3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

**3.4 ADJUSTING**

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

**3.5 PAINTING**

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

**3.6 HANGER AND SUPPORT SCHEDULE**

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- G. Use thermal-hanger shield inserts for insulated piping and tubing.
- H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
- I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
  - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

- J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
  2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
  3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
  4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
  5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.
- K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
  2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  5. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb (340 kg).
    - b. Medium (MSS Type 32): 1500 lb (680 kg).
    - c. Heavy (MSS Type 33): 3000 lb (1360 kg).
  6. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
  3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- M. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

**END OF SECTION 23 0529**



**SECTION 23 0553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Equipment labels.
  - 2. Pipe labels.
  - 3. Valve tags.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

**PART 2 - PRODUCTS**

2.1 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
  - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.
  - 2. Letter Color: Black.
  - 3. Background Color: White.

4. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
  5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
  6. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  7. Fasteners: Stainless-steel self-tapping screws.
  8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

## 2.2 STENCILS

- A. Stencils for Piping:
1. Lettering Size: Size letters according to ASME A13.1 for piping and at least 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm) and proportionately larger lettering for greater viewing distances.
  2. Stencil Material: Fiberboard or metal.
  3. Stencil Paint: Exterior, gloss, acrylic enamel in colors complying with recommendations in ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.
  4. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.

## 2.3 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4 inch (6.4 mm) letters for piping system abbreviation and 1/2 inch (13 mm) numbers.
1. Tag Material: Aluminum, 0.032 inch (0.8 mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
  2. Fasteners: Brass wire-link or beaded chain.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
1. Valve-tag schedule shall be included in operation and maintenance data.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

**3.2 EQUIPMENT LABEL INSTALLATION**

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

**3.3 PIPE LABEL INSTALLATION**

- A. All exposed piping shall be painted. The color will be selected by engineer.
- B. Stenciled Pipe Label: Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.
  - 1. Identification Paint: Use for contrasting background.
  - 2. Stencil Paint: Use for pipe marking.
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 20 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment.
  - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- D. Pipe Label Color Schedule:
  - 1. Heating Water Piping:
    - a. Background Color: Yellow.
    - b. Letter Color: Black.

**3.4 VALVE-TAG INSTALLATION**

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
  - 1. Valve-Tag Size and Shape:
    - a. Hot Water: 1-1/2 inches (38 mm), round.
  - 2. Valve-Tag Color:
    - a. Hot Water: Red.
  - 3. Letter Color:
    - a. Hot Water: Black.

**END OF SECTION 23 0553**

**SECTION 23 0593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Balancing Air Systems:
    - a. Variable-air-volume systems.
  - 2. Balancing Hydronic Piping Systems:
    - a. Constant-flow hydronic systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 45 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 90 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.

F. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

#### 1.5 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC or NEBB.

B. TAB Conference: Meet with Engineer on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items:

- a. The Contract Documents examination report.
- b. The TAB plan.
- c. Coordination and cooperation of trades and subcontractors.
- d. Coordination of documentation and communication flow.

C. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard TAB contractor's forms approved by Engineer.

E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 "Air Balancing."

G. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 "System Balancing."

#### 1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

#### 1.7 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves.
  - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
  - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
- K. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
- L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- M. Examine system pumps to ensure absence of entrained air in the suction piping.
- N. Examine operating safety interlocks and controls on HVAC equipment.

- O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

### 3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
  - 1. Permanent electrical-power wiring is complete.
  - 2. Hydronic systems are filled, clean, and free of air.
  - 3. Automatic temperature-control systems are operational.
  - 4. Equipment and duct access doors are securely closed.
  - 5. Balance, smoke, and fire dampers are open.
  - 6. Isolating and balancing valves are open and control valves are operational.
  - 7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
  - 8. Windows and doors can be closed so indicated conditions for system operations can be met.

### 3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
  - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
  - 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish.
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

### 3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.



- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check dampers for proper position to achieve desired airflow path.
- F. Check for airflow blockages.

### 3.5 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
- B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
  - 1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
  - 2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
  - 3. Measure total system airflow. Adjust to within indicated airflow.
  - 4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
  - 5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
    - a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.
  - 6. Re-measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
    - a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.
  - 7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
  - 8. Record final fan-performance data.

### 3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
  - 1. Open all manual valves for maximum flow.
  - 2. Check liquid level in expansion tank.
  - 3. Check makeup water-station pressure gage for adequate pressure for highest vent.
  - 4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
  - 5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
  - 6. Set system controls so automatic valves are wide open to heat exchangers.
  - 7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
  - 8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

### 3.7 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

- A. Measure water flow at pumps. Use the following procedures except for positive-displacement pumps:
  - 1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
    - a. If impeller sizes must be adjusted to achieve pump performance, obtain approval from Engineer and comply with requirements in "Hydronic Pumps."
  - 2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.
    - a. Monitor motor performance during procedures and do not operate motors in overload conditions.
  - 3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
  - 4. Report flow rates that are not within plus or minus 10 percent of design.
- B. Measure flow at all automatic flow control valves to verify that valves are functioning as designed.
- C. Measure flow at all pressure-independent characterized control valves, with valves in fully open position, to verify that valves are functioning as designed.
- D. Set calibrated balancing valves, if installed, at calculated presettings.
- E. Measure flow at all stations and adjust, where necessary, to obtain first balance.
  - 1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.

- F. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.
- G. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
  - 1. Determine the balancing station with the highest percentage over indicated flow.
  - 2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
  - 3. Record settings and mark balancing devices.
- H. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.
- I. Measure the differential-pressure-control-valve settings existing at the conclusion of balancing.
- J. Check settings and operation of each safety valve. Record settings.

### 3.8 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Measure, adjust, and record the following data for each water coil:
  - 1. Entering- and leaving-water temperature.
  - 2. Water flow rate.
  - 3. Water pressure drop.
  - 4. Dry-bulb temperature of entering and leaving air.
  - 5. Wet-bulb temperature of entering and leaving air for cooling coils.
  - 6. Airflow.
  - 7. Air pressure drop.

### 3.9 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
  - 2. Air Outlets and Inlets: Plus or minus 10 percent.
  - 3. Heating-Water Flow Rate: Plus or minus 10 percent.
  - 4. Cooling-Water Flow Rate: Plus or minus 10 percent.

### 3.10 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare monthly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

**3.11 FINAL REPORT**

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
  2. Include a list of instruments used for procedures, along with proof of calibration.
- B. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
  2. Name and address of the TAB contractor.
  3. Project name.
  4. Project location.
  5. Architect's name and address.
  6. Engineer's name and address.
  7. Contractor's name and address.
  8. Report date.
  9. Signature of TAB supervisor who certifies the report.
  10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
  11. Summary of contents including the following:
    - a. Indicated versus final performance.
    - b. Notable characteristics of systems.
    - c. Description of system operation sequence if it varies from the Contract Documents.
  12. Nomenclature sheets for each item of equipment.
  13. Data for terminal units, including manufacturer's name, type, size, and fittings.
  14. Notes to explain why certain final data in the body of reports vary from indicated values.
  15. Test conditions for fans and pump performance forms including the following:
    - a. Settings for outdoor-, return-, and exhaust-air dampers.
    - b. Conditions of filters.
    - c. Cooling coil, wet- and dry-bulb conditions.
    - d. Face and bypass damper settings at coils.
    - e. Fan drive settings including settings and percentage of maximum pitch diameter.
    - f. Inlet vane settings for variable-air-volume systems.
    - g. Settings for supply-air, static-pressure controller.
    - h. Other system operating conditions that affect performance.
- C. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of supply and return airflows.
  2. Water flow rates.
  3. Duct, outlet, and inlet sizes.
  4. Pipe and valve sizes and locations.
  5. Terminal units.
  6. Position of balancing devices.

D. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:
  - a. Unit identification.
  - b. Location.
  - c. Make and type.
  - d. Model number and unit size.
  - e. Manufacturer's serial number.
2. Motor Data:
  - a. Motor make, and frame type and size.
  - b. Horsepower and rpm.
  - c. Volts, phase, and hertz.
  - d. Full-load amperage and service factor.
3. Test Data (Indicated and Actual Values):
  - a. Total air flow rate in cfm (L/s).
  - b. Total system static pressure in inches wg (Pa).
  - c. Fan rpm.
  - d. Discharge static pressure in inches wg (Pa).
  - e. Filter static-pressure differential in inches wg (Pa).
  - f. Preheat-coil static-pressure differential in inches wg (Pa).
  - g. Cooling-coil static-pressure differential in inches wg (Pa).
  - h. Return airflow in cfm (L/s).
  - i. Outdoor-air damper position.
  - j. Return-air damper position.
  - k. VFD reading.

E. Apparatus-Coil Test Reports:

1. Test Data (Indicated and Actual Values):
  - a. Air flow rate in cfm (L/s).
  - b. Air pressure drop in inches wg (Pa).
  - c. Outdoor-air, wet- and dry-bulb temperatures in deg F (deg C).
  - d. Return-air, wet- and dry-bulb temperatures in deg F (deg C).
  - e. Entering-air, wet- and dry-bulb temperatures in deg F (deg C).
  - f. Leaving-air, wet- and dry-bulb temperatures in deg F (deg C).
  - g. Water flow rate in gpm (L/s).
  - h. Water pressure differential in feet of head or psig (kPa).
  - i. Entering-water temperature in deg F (deg C).
  - j. Leaving-water temperature in deg F (deg C).

F. Air-Terminal-Device Reports:

1. Unit Data:
  - a. System and air-handling unit identification.
  - b. Location and zone.
  - c. Apparatus used for test.
  - d. Area served.
  - e. Make.

- f. Number from system diagram.
      - g. Type and model number.
      - h. Size.
      - i. Effective area in sq. ft. (sq. m).
    - 2. Test Data (Indicated and Actual Values):
      - a. Air flow rate in cfm (L/s).
      - b. Air velocity in fpm (m/s).
      - c. Preliminary air flow rate as needed in cfm (L/s).
      - d. Preliminary velocity as needed in fpm (m/s).
      - e. Final air flow rate in cfm (L/s).
      - f. Final velocity in fpm (m/s).
      - g. Space temperature in deg F (deg C).
  - G. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:
    - 1. Unit Data:
      - a. System and air-handling-unit identification.
      - b. Location and zone.
      - c. Room or riser served.
      - d. Coil make and size.
      - e. Flowmeter type.
    - 2. Test Data (Indicated and Actual Values):
      - a. Air flow rate in cfm (L/s).
      - b. Entering-water temperature in deg F (deg C).
      - c. Leaving-water temperature in deg F (deg C).
      - d. Water flow rate in gpm (L/s)
      - e. Water pressure drop in feet of head or psig (kPa).
      - f. Entering-air temperature in deg F (deg C).
      - g. Leaving-air temperature in deg F (deg C).
  - H. Instrument Calibration Reports:
    - 1. Report Data:
      - a. Instrument type and make.
      - b. Serial number.
      - c. Application.
      - d. Dates of use.
      - e. Dates of calibration.
- 3.12 INSPECTIONS
- A. Initial Inspection:
    - 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
    - 2. Check the following for each system:

- a. Measure airflow of at least 10 percent of air outlets.
  - b. Measure water flow of at least 5 percent of terminals.
  - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
  - d. Verify that balancing devices are marked with final balance position.
  - e. Note deviations from the Contract Documents in the final report.
- B. Final Inspection:
1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Engineer.
  2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Engineer.
  3. Engineer shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
  4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
  5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
  2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.

**END OF SECTION 23 0593**





**SECTION 23 0713 - DUCT INSULATION**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes insulating the following duct services:
  - 1. Indoor, concealed supply and return air.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
  - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

**PART 2 - PRODUCTS**

2.1 INSULATION MATERIALS

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. CertainTeed Corp.; SoftTouch Duct Wrap.
  - b. Johns Manville; Microlite.
  - c. Knauf Insulation; Friendly Feel Duct Wrap.
  - d. Owens Corning; SOFTR All-Service Duct Wrap.

## 2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
- D. For indoor applications, adhesives shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
  1. For indoor applications, use mastics that have a VOC content of 300 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
  1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43 mil (1.09 mm) dry film thickness.
  2. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
  3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
  4. Color: White.

## 2.4 SEALANTS

- A. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:
  1. Materials shall be compatible with insulation materials, jackets, and substrates.
  2. Fire- and water-resistant, flexible, elastomeric sealant.
  3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
  4. Color: White.
  5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

**2.5 FACTORY-APPLIED JACKETS**

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

**2.6 TAPES**

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Width: 3 inches (75 mm).
  2. Thickness: 11.5 mils (0.29 mm).
  3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
  4. Elongation: 2 percent.
  5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
  6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

**2.7 SECUREMENTS**

- A. Insulation Pins and Hangers:
1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
    - a. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
    - b. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106 inch (2.6 mm) diameter shank, length to suit depth of insulation indicated.
    - c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
  2. Insulation-Retaining Washers: Self-locking washers formed from 0.016 inch (0.41 mm) thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.
    - a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
- B. Staples: Outward-clinching insulation staples, nominal 3/4 inch (19 mm) wide, stainless steel or Monel.

**PART 3 - EXECUTION**

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Keep insulation materials dry during application and finishing.
- F. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- G. Install insulation with least number of joints practical.
- H. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- I. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- J. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3 inch (75 mm) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) 4 inches (100 mm) o.c.
    - a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

### 3.3 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).
- C. Insulation Installation at Floor Penetrations:
1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches (50 mm).
  2. Seal penetrations through fire-rated assemblies.

### 3.4 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
  2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
    - b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not over compress insulation during installation.
    - e. Impale insulation over pins and attach speed washers.

- f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2 inch (13 mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
    - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    - b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18 foot (5.5 m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm).
  5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.
  6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
  7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6 inch (150 mm) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

### 3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.6 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
  1. Indoor, concealed supply and return air.
- B. Items Not Insulated:
  1. Fibrous-glass ducts.
  2. Factory-insulated flexible ducts.
  3. Factory-insulated plenums and casings.
  4. Flexible connectors.
  5. Vibration-control devices.
  6. Factory-insulated access panels and doors.

**3.7 INDOOR DUCT AND PLENUM INSULATION SCHEDULE**

- A. Concealed, Supply-Air Duct and Plenum Insulation: Mineral-fiber blanket 2 inches (50 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density.
- B. Concealed, Return-Air Duct and Plenum Insulation: Mineral-fiber blanket 2 inches (50 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density.

**3.8 INDOOR, FIELD-APPLIED JACKET SCHEDULE**

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

**END OF SECTION 23 0713**





**SECTION 23 0719 - HVAC PIPING INSULATION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes insulating the following HVAC piping systems:
  - 1. Heating hot-water piping, indoors.

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

**1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
  - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

**1.6 COORDINATION**

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

**1.7 SCHEDULING**

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

**PART 2 - PRODUCTS**

**2.1 INSULATION MATERIALS**

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- E. Mineral-Fiber, Preformed Pipe Insulation:
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Fibrex Insulations Inc.; Coreplus 1200.
    - b. Johns Manville; Micro-Lok.
    - c. Knauf Insulation; 1000-Degree Pipe Insulation.
    - d. Manson Insulation Inc.; Alley-K.
    - e. Owens Corning; Fiberglas Pipe Insulation.
  - 2. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

**2.2 INSULATING CEMENTS**

- A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
- B. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

**2.3 ADHESIVES**

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
  - 1. For indoor applications, adhesive shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

**2.4 MASTICS**

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
  - 1. For indoor applications, use mastics that have a VOC content of 300 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
  - 1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43 mil (1.09 mm) dry film thickness.
  - 2. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
  - 3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
  - 4. Color: White.

**2.5 LAGGING ADHESIVES**

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
  - 1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
  - 2. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
  - 3. Color: White.
- B. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

**2.6 SEALANTS**

- A. Joint Sealants:
  - 1. Materials shall be compatible with insulation materials, jackets, and substrates.

2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
4. Color: White or gray.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. FSK and Metal Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
4. Color: Aluminum.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.8 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz. /sq. yd. (271 g/sq. m).

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. Metal Jacket:

1. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.
  - a. Sheet and roll stock ready for shop or field sizing.
  - b. Finish and thickness are indicated in field-applied jacket schedules.
  - c. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
  - d. Factory-Fabricated Fitting Covers:
    - 1) Same material, finish, and thickness as jacket.
    - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
    - 3) Tee covers.
    - 4) Flange and union covers.
    - 5) End caps.
    - 6) Beveled collars.
    - 7) Valve covers.
    - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

**2.10 TAPES**

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
  - 1. Width: 3 inches (75 mm).
  - 2. Thickness: 11.5 mils (0.29 mm).
  - 3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
  - 4. Elongation: 2 percent.
  - 5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
  - 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

**2.11 SECUREMENTS**

- A. Staples: Outward-clinching insulation staples, nominal 3/4 inch (19 mm) wide, stainless steel or Monel.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
  - 1. Verify that systems to be insulated have been tested and are free of defects.
  - 2. Verify that surfaces to be insulated are clean and dry.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

**3.3 GENERAL INSTALLATION REQUIREMENTS**

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3 inch (75 mm) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) o.c.
    - a. For below-ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
  
- P. For above-ambient services, do not install insulation to the following:
  - 1. Vibration-control devices.
  - 2. Testing agency labels and stamps.
  - 3. Nameplates and data plates.
  - 4. Manholes.
  - 5. Handholes.
  - 6. Cleanouts.

### 3.4 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

### 3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
  
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
  - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
  - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
  - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
  - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
  - 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
  - 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
  - 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for

- above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
  2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
  3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
  4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

### 3.6 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
  2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
  3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
  4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
  2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
  3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
  4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.



- C. Insulation Installation on Pipe Fittings and Elbows:
  - 1. Install preformed sections of same material as straight segments of pipe insulation when available.
  - 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
  
- D. Insulation Installation on Valves and Pipe Specialties:
  - 1. Install preformed sections of same material as straight segments of pipe insulation when available.
  - 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
  - 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
  - 4. Install insulation to flanges as specified for flange insulation application.

### 3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Where glass-cloth jackets are indicated, install directly over insulation with factory-applied jackets.
  - 1. Draw jacket smooth and tight to surface with 2 inch (50 mm) overlap at seams and joints.
  - 2. Embed glass cloth between two 0.062 inch (1.6 mm) thick coats of lagging adhesive.
  - 3. Completely encapsulate insulation with coating, leaving no exposed insulation.
  
- B. Where FSK jackets are indicated, install as follows:
  - 1. Draw jacket material smooth and tight.
  - 2. Install lap or joint strips with same material as jacket.
  - 3. Secure jacket to insulation with manufacturer's recommended adhesive.
  - 4. Install jacket with 1-1/2 inch (38 mm) laps at longitudinal seams and 3 inch (75 mm) wide joint strips at end joints.
  - 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
  
- C. Where metal jackets are indicated, install with 2 inch (50 mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

### 3.8 FINISHES

- A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below:
  - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
    - a. Finish Coat Material: Interior, flat, latex-emulsion size.
  
- B. Color: Final color as selected by Engineer.

**3.9 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

**3.10 PIPING INSULATION SCHEDULE, GENERAL**

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

**3.11 INDOOR PIPING INSULATION SCHEDULE**

- A. Heating-Hot-Water Supply and Return, 200 Deg F (93 Deg C) and Below:
  - 1. NPS 12 (DN 300) and Smaller: Insulation shall be the following:
    - a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches (50 mm) thick.

**3.12 INDOOR, FIELD-APPLIED JACKET SCHEDULE**

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. Piping, Exposed:
  - 1. Canvas Jacket on all exposed pipes and all exposed pipes in chases.

**END OF SECTION 23 0719**

**SECTION 23 0900 - DIRECT DIGITAL CONTROL SYSTEMS AND BUILDING AUTOMATION SYSTEM**

**PART 1 - GENERAL**

1.1 SECTION INCLUDES

- A. Control equipment.
- B. Software.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

- A. This Section shall provide the Direct Digital Control (DDC), Energy Management and Building Automation System (BAS) for the air conditioning, heating and ventilating systems, lighting controls and shall interface with other microprocessor based building subsystems as shown on the drawings and as specified.
- B. This controls specification includes hardware and software designed to control the building system with full graphical representation.
- C. The controls vendor should ensure the building is operating independently of the graphics and has communication back to the GSA server housing the engineering or configuration software. All sequences should be fully functional and verified.
- D. Related Section: Division 23 Section "Sequence of Operation" contains requirements that relate to this Section.

1.4 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Hydronic Piping: Installation of all wells, control valves, flow switches, temperature sensor sockets, gage taps, flow meters.
- B. Ductwork Accessories: Installation of flow stations, automatic dampers, smoke detectors. Connection of damper end switches Gas Piping: Installation of natural gas flow meters.
- C. Water Flow: Installation of water flow meters.

1.5 REFERENCES

- A. ASHRAE standard 135-2010.
- B. ASME MC85.1.

- C. NEMA EMC1.

#### 1.6 DEFINITIONS

- A. BACnet: An industry standard data communications protocol for Building Automation Control Networks. Refer to ASHRAE standard 135-2010.
- B. SEC-WAN- Secure Engineered Controls Wide Area Network - Ethernet based network linking remote Wake Co. Facilities with a central location for the purpose of transmitting and receiving building control information. Traffic over this network will be TCP/IP packets.
- C. High Tier- That portion of the Vendor System that connects to the SEC-WAN directly using Ethernet as the physical medium. This is an open, interconnected system that each vendor must be capable of connecting to using standard Ethernet.
- D. Building Level Network (BLN)- That portion of the Vendor System that connects the network controller to the specific monitoring and control devices in the building. Physical medium is serial (RS-485, RS-232) or Ethernet. Traffic over this network shall be BACnet MS/TP or BACnet IP under vendor created subnetwork.
- E. Server- Centrally located, at General Services Center, 401 Capital Blvd., LAN attached, Rack-mounted server computer running Windows Server operating system. High Tier communicate to Server via Ethernet, TCP/IP connection.
- F. Building Controller- located in each facility, continually monitors field devices to ensure proper function. The controller is standalone. The controller serves as a gateway between the BLN and the SEC-WAN.
- G. TEC or ASC (Device Controller)- Connected to the Network Controller via TCP/IP, MS/TP, or/RS-485/RS-232E. Directly regulates field devices.
- H. Workstation: Operating on latest County approved version of Microsoft Windows Operating System. Device used to send configuration data to either the server or the network controller. Used to upload field panel program to server or download field panel program from server to field panel. Field Devices- Pump controller, chiller controller, actuator, etc.

#### 1.7 SYSTEM DESCRIPTION

- A. Building Automation System (BAS) Contractor shall provide.
  - 1. A fully integrated building automation system (BAS), UL listed, incorporating direct digital control (DDC) for energy management, equipment monitoring and control, and lighting control capabilities; including interface by ethernet to the existing Wake County - Secure Engineered Controls Wide Area Network (SEC-WAN).
  - 2. Complete temperature and lighting control system to be DDC as specified herein.
  - 3. All wiring, conduit, panels, for all DDC temperature controls.
  - 4. All final electrical connections to each stand-alone Application Specific Controller and DDC Controller.
  - 5. BAS Contractor shall be responsible for all electrical work associated with the BAS control system and as called for on the Drawings.
    - a. Perform all wiring in accordance with all local and national codes.
    - b. Install all line voltage wiring, concealed or exposed, in accordance with Division 26.

- c. Electrical Contractor shall provide 120 volt, 20 amp circuits and circuit breakers from normal and/or emergency power panel for direct digital control systems.
- d. BAS contractor to provide UPS power for Control Panel where indicated on drawings
- e. Surge transient protection and power conditioners shall be incorporated in design of system to protect electrical components in all DDC Controllers, Application Specific Controllers and operator's workstations.
- f. All low voltage electrical control wiring throughout the building shall be installed in accordance with Division 26. Except that digital control wiring and 24V power bus may be run without conduit in accessible ceiling spaces under the provision of NEC, Class 2 when approved.

**B. General Product Description:**

1. The building automation system (BAS) shall integrate multiple building functions including equipment supervision and control, alarm management, energy management, lighting control and historical data collection. The Building Automation System shall be fully compatible and shall be fully integrated with the existing system presently owned and operated by Wake County.
2. The building automation system shall consist of the following:
  - a. Connection of BAS by Ethernet to dedicated Wake County General Services Administration Building Controls Server. Additional software and programming for BAS Workstation, as specified.
  - b. Stand-alone DDC Controllers compatible with those already installed by Wake County.
  - c. Stand-alone Application Specific Controllers (ASCs.) (ie. Gateway to central building equipment).
3. The system shall be modular in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, DDC Controllers, Application Specific Controllers and operator devices.
4. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC Controller shall operate independently by performing its own specified control, alarm management, operator I/O and data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.
5. DDC Controllers shall be able to access any data from, or send control commands and alarm reports directly to, any other DDC Controller or combination of controllers on the network without dependence upon on network communication outside the controlled building. DDC Controllers shall also be able to send alarm reports to multiple operator workstations without dependence upon a central processing device.

**1.8 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections. A minimum of 1 PDF set of documents are required. Building Number verification: The building number should be confirmed with GSA through official written construction communication.
- B. BACnet instance number submittal per the form included in this specification will be completed. BACnet instance numbers are managed by Wake County and are assigned to individual devices. See instance number naming convention for the starting point. Building number and acronym should be confirmed with the County.

- C. BACnet point names should be submitted for all equipment and physical points planned in the project. These point names should adhere to the County naming convention attached. PDF or spreadsheet submission for this specific submittal are acceptable.
- D. Manufacturer's Product Data for each and all types of products specified. Include manufacturer's technical Product Data for each control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials, installation instructions, and startup instructions.
  - 1. Submit manufacturer's product information on all hardware items along with descriptive literature for all software programs to show compliance with specifications.
- E. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Submit damper leakage and flow characteristics, plus size schedule for controlled dampers.
- F. Shop Drawings, PDF, containing the following information for each control system:
  - 1. Schematic flow diagram showing fans, pumps, coils, dampers, valves, and control devices.
  - 2. Each control device labeled with setting or adjustable range of control.
  - 3. Diagrams for all required electrical wiring. Clearly differentiate between factory-installed and field-installed wiring.
  - 4. Details of control panel faces, including controls, instruments, and labeling.
  - 5. Written description of sequence of operation.
  - 6. Trunk cable schematic showing programmable control unit locations and trunk data conductors.
  - 7. Listing of connected data points, including connected control unit and input device. Itemized list should include each point name per Wake County's point name convention, the control point name and description.
  - 8. Devices with imported points which do not follow the County's point name convention should be converted in a field panel to follow the convention.
  - 9.
  - 10. System configuration showing peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
  - 11. Software description and sequence of operation. This shall include both printed and electronic copies of the program. It shall also include a layman's description of the sequence and a flow chart for a non-programmers interpretation.
  - 12. System configuration diagram showing all panel types and locations as well as communications network and workstations.
- G. Graphics – Control graphics should be submitted to the county in PDF format. The graphics should be complete with point values populated or simulated to shot value font, size, color and unit of measure.
- H. Wiring diagrams detailing wiring for power, signal, and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.
- I. Where installation procedures, or any part thereof, are required to be in accord with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect/Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received.

**1.9 ADDITIONAL REQUIREMENTS**

**A. Correction of Work:**

1. Contractor's Responsibility. The Contractor shall promptly correct all work the Owner finds defective or failing to conform to the Contract Documents. The Contractor shall bear all cost of correcting such work.
2. During Warranty. If, within the warranty period required by the Contract Documents, any of the work is found to be defective in material or workmanship or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of notice from Owner to do so. Owner shall give notice promptly after discovery of the condition. Contractor shall notify owner within 24 hours of proposed corrections and schedule.

**B. Coordination of Work During Construction:**

1. The Contractor shall protect the installed works by other trades.
2. The Contractor shall coordinate with other trades.
3. The Contractor shall repair any damage caused by his work to building(s) and equipment.
4. The contractor shall maintain functionality of all existing systems throughout project.

**C. Warranty and Service:**

1. Standard Warranty.
  - a. The Contractor shall warrant the system to be free from defects in material and workmanship for a period of one (1) years from the date of completion and acceptance of the work by the Owner. Any defects shall be repaired or replaced, including materials and labor at no cost to Wake County.
2. Wake County reserves the right to make changes to the BAS during the Warranty Period. Such changes do not constitute a waiver of warranty. Contractor shall warrant parts and installation work regardless of any such changes made by Wake County, unless the Contractor provides clear and convincing evidence that a specific problem is the result of such changes to the BAS.
3. Service Response Requirements during the Warranty Period.
  - a. Emergency Service: Any malfunction, failure, or defect in any hardware component or failure of any control programming that would result in property damage or loss of comfort control shall be corrected and repaired following telephonic, text, or email notification by the Owner to the Contractor. Emergency service shall be provided 24 hours per day, 7 days per week, and 365 days per year with no exceptions and at no cost to Wake County.
  - b. Technician response by telephone, text, or email to any request for service shall be provided within two (2) hours of Wake County's initial request for service.
  - c. In the event that the malfunction, failure, or defect is not corrected through the telephonic communication, at least one (1) hardware and software technician, trained in the system to be serviced, shall be dispatched to the Wake County site within four (4) hours of the Wake County initial request for such services, as specified.
  - d. Normal Service: Any malfunction, failure, or defect in any hardware component or failure of any control programming that would not result in property damage or loss of comfort control shall be corrected and repaired following telephonic, text, or email notification by the Wake County to the Contractor.

- e. Response by telephone, text, or email to any request for service shall be provided within eight (8) working hours (Contractor specified 40 hours per week normal working period) of the Wake County initial request for service.
- f. In the event that the malfunction, failure, or defect is not corrected through the telephonic communication, at least one (1) hardware and software technician, trained in the system to be serviced, shall be dispatched to the Wake County site within three (3) working days of the Wake County initial request for such services, as specified.
- g. At any time during the Warranty Period that Contractor is on Site for maintenance, emergency, or normal service, Contractor shall notify Wake County and the local building operating personnel. Contractor shall notify said personnel of all work anticipated being involved for the service work. In addition, no work affecting system operation shall commence until express permission is granted. After the work is completed a work order ticket describing in detail all work performed (i.e. hardware replaced or serviced, software or firmware modifications made, etc.), hours worked, follow-up work required, etc., must be signed by an authorized building operator.
- h. Wake County Telephonic Request for Service: Contractor shall specify a maximum of three telephone numbers for Wake County to call in the event of a need for service. At least one of the lines shall be attended at any given time at all times. Alternatively, text messaging can be used for technicians trained in system to be serviced. One of the three notified technicians shall respond to every call within 15 minutes.
- i. Technical Support: Contractor shall provide technical support by telephone throughout the Warranty Period.
- j. Preventive maintenance shall be provided throughout the Warranty Period in accordance with the hardware component manufacturer's requirements.
- k. In the last month of the Warranty Period, all System software and controller firmware, software, drivers, etc. will be upgraded to the latest release (version) in effect at the end of the Warranty Period.

**D. Post-warranty Service.**

- 1. Contractor shall ensure accessibility to technical support and replacement parts for ten (10) years past the warranty period.

**1.10 PROJECT RECORD DOCUMENTS**

- A. Submit under provision of Division 01.
- B. Accurately record actual location of control components, including but not limited to, panels, thermostats, and sensors.
- C. Revise shop drawings to reflect actual installation and operating sequences.
- D. Include data specified in "Submittals" in final "Record Documents" form in hard copy form and in CAD. (DWG or DXF format).
- E. Include a USB drive backup of all BAS control programs in addition to server backup.

**1.11 OPERATION AND MAINTENANCE DATA**

- A. Submit under provisions of Division 01.



- B. Maintenance instructions and spare parts list for each type of control device.
- C. Interconnection wiring diagrams with identified and numbered system components and devices.
- D. Final shop drawings should be printed and located in a document sleeve within each control panel.
- E. Keyboard illustrations and step-by-step procedures indexed for each operator function.
- F. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
- G. Calibration records and list of set points.
- H. Submit quotation for annual maintenance service for after the warranty period.

**1.12 QUALIFICATIONS & QUALITY ASSURANCE**

- A. Materials and equipment shall be the catalogued products of manufacturers regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design that complies with the specification requirements.
- B. Install system using competent workmen who are fully trained in the installation of temperature control equipment.
- C. Single source responsibility of supplier shall be the complete installation and proper operation of the BAS and control system and shall include debugging and proper calibration of each component in the entire system.
- D. Supplier shall have an in-place support facility within 50 miles of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.
- E. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Section 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.
- F. BAS shall comply with UL 916 PAZX and 864 UDTZ and be so listed at the time of bid.
- G. Design and build all system components to be fault-tolerant.
  - 1. Satisfactory operation without damage at 110% and 85% of rated voltage and at plus or minus 3 Hertz variation in line frequency.
  - 2. Static, transient and short-circuit protection on all inputs and outputs.
  - 3. Protect communication lines against incorrect wiring, static transients and induced magnetic interference.
  - 4. Network-connected devices to be A.C. coupled or equivalent so that any single device failure will not disrupt or halt network communication.
  - 5. All real time clocks and data file RAM to be battery-backed for a minimum 72 hours and include local and system low battery indication.
  - 6. It must be possible to receive and print out alarms at a central location even when the Server/workstation at that location is nonoperational or taken out of service for periodic maintenance.

- H. Supplier shall be either the authorized regional manufacturer's representative as such with Siemens Building Technologies, Inc., Schneider Electric, or the manufacturer's Authorized Controls Integrator as such with Honeywell International, Inc.

**1.13 PRE-INSTALLATION CONFERENCE**

- A. Convene a conference two weeks prior to commencing work of this Section, under provisions of Division 01.
- B. Require attendance of parties directly affecting the work of this Section. Controls technicians familiar with the controls wiring and programming are required to attend.

**1.14 COORDINATION**

- A. The Control System contractor shall schedule and attend a pre-submittal (prior to submission of control diagrams) meeting with Owner for purposes of resolving any potential problems regarding the interface of the proposed system with those existing within General Services and present schedule for approval.
- B. A controls technician familiar with the controls wiring and programming are required to attend both biweekly meetings and commissioning meetings when scheduled.
- C. BACnet instance number submittal sheet must be submitted to GSA to obtain BACnet instance IDs. Equipment should not be connected to the network until configured with the Instance IDs provided.
- D. The control system contractor shall adhere to the Wake County equipment and point naming convention. Controls system contractor shall schedule a nomenclature coordination meeting to occur after notice to proceed, but before contractor begins DDC work. Nomenclature must be approved by GSA. Incorrect point names will be required to be corrected by the completion of the project.
- E. Programming of Control system modifications necessitated by this Project will be done at the General Services' terminal located at 401 Capital Blvd., Raleigh, NC or on-site as necessary. This programming will be complete by the authorized Programmer representing the Control System contractor. Coordination of Owner specified point designations and scheduling of the programming will be the responsibility of the Control System contractor (to be coordinated with Owner). Programming must be done prior to Wake County acceptance of system maintenance responsibility. Any option to perform remote programming or configuration is only allowed at the discretion of the County and is not guaranteed.
- F. System Start-up and Acceptance: Upon completion of the installation, start-up the system and perform all necessary testing. When the system performance is deemed satisfactory in whole or part by Architect/Engineer and by the Wake County Representative, designated by Wake County officials, the system parts will be accepted for beneficial use and placed under warranty. Warranty shall not commence prior to receipt of certificate of completion from Architect/Engineer.
- G. System Testing and Balancing: The Control System contractor shall participate in the Testing and Balancing of the HVAC System and Wake County GSA Representative. The control contractor shall support the Testing and Balancing contractor through the entirety of balancing.

1.15 INPUT/OUTPUT SUMMARY

- A. Refer to end of this Section and on drawings.

**PART 2 - PRODUCTS**

2.1 ACCEPTABLE MANUFACTURERS

- A. Siemens Building Technologies, Inc. APOGEE.

2.2 NETWORK

- A. All networked control products shall be comprised of an industry standard open protocol internetwork. Communication involving control components (i.e. all types of controllers and operator interfaces) shall conform to ASHRAE 135-2010 BACnet standard. Networks and protocols proprietary to one company or distributed by one company are prohibited.
- B. Access to system data shall not be restricted by the hardware configuration of the building management system. The hardware configuration of the BMS network shall be totally transparent to the user when accessing data or developing control programs.
  - 1. Software applications, features, and functionality, including administrative configurations, shall not be separated into several network control engines working together.
- C. BAS Server shall be capable of simultaneous direct connection and communication with BACnet/IP corporate level networks without the use of interposing devices.
- D. Any break in Ethernet communication from the PC to the controllers on the Primary Network shall result in a notification at the PC.
- E. Any break in Ethernet communication between the standard client and server workstations on the Primary Network shall result in a notification at each workstation.
- F. The network architecture shall consist of two levels of networks:
  - 1. The High Tier level network shall be BACnet/IP over Ethernet. It shall network the Building Automation Server, Operator workstations, and Building level controllers. Provide network media converters, routers and switches as necessary for a complete network.
- G. The Floor level network shall be BACnet over the native infrastructure (i.e. if BACnet MS/TP native, all devices should communicate over MS/TP. If BACnet IP native, all devices should communicate over IP to a dedicated BMS router placed inside a BMS enclosure). It shall network to all of the DDC controlled equipment on a floor or in a system and network to a router that connects to the Automaton level BAS backbone. Controllers for the central plant and large infrastructure air handlers shall reside on the backbone BACnet/IP network. The Building Level Controllers shall be able to support subnetwork protocols that may be needed depending on the type of equipment or application. Subnetworks shall be limited to:
  - 1. BACnet MS/TP.
  - 2. Modbus.
  - 3. BACnet IP (On dedicated BMS sub-network).

- H. Use fiber optic cabling for all Ethernet runs longer than 300 ft.
- I. Where a smoke control application is required, provide UL 864 / UUKL listed network switches, and NFPA approved cabling, enclosures and installation methods.
- J. The system shall be installed with a 10% spare capacity on each subnetwork for the addition of future controllers.

### 2.3 DISTRIBUTED CONTROL REQUIREMENTS

- A. The loss of any one DDC controller shall not affect the operation of other HVAC systems, only for the points connected to the DDC controller.
- B. The system shall be scalable in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, DDC Controllers, and operator devices.
- C. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC Controller shall operate independently by performing its own specified control, alarm management, operator I/O, and data collection. The failure of any single component or network connection shall not interrupt the execution of any control strategy, reporting, alarming and trending function, or any function at any operator interface device.
- D. DDC Controllers shall be able to access any data from, or send control commands and alarm reports directly to, any other DDC Controller on the network without dependence upon a central processing device. DDC Controllers shall also be able to send alarms to multiple operator workstations without dependence upon a central or intermediate processing device.

### 2.4 SERVER: Existing Server

- A. Owner will provide specifications of existing server upon request.
- B. OWNER will provide necessary hardware and software to ensure that the server is backed up fully on a daily basis and could be quickly restored if necessary.
- C. Vendor will provide and install any add on software not native to the Network Operating System to ensure full functionality resulting from the addition of this contract in the area of reporting capability and database storage (SQL Server, Sybase, Crystal Reports, etc.). Vendor should verify the installation of the software is adequate to meeting the project requirements.
- D. OWNER will ensure that the server is backed up by an UPS to prevent power outage.
- E. If owner does not possess manufacturers' high-tier equipment, vendor must supply server per Wake County standards, 1 workstation, and all software necessary to connect and control building per this document. Specifications should be confirmed prior to bid.

### 2.5 BAS SOFTWARE

- A. Overview.
  - 1. The BAS Contractor shall provide system software capable of engineering level configuration. A thick client GUI shall provide comprehensive user interface and configuration tools to view and edit graphics, controller-level programming, points,

- schedules, trends, and alarms. Controller programming must be able to be viewed, edited, backed up and reloaded to the controller over the network.
2. The BAS Contractor shall provide system software based on server/thin-client architecture, designed around the open standards of web technology. The BAS server shall communicate using Ethernet and TCP/IP. Server shall be accessed using a web browser over Owner virtual private network.
  3. Graphic software shall facilitate user-friendly interface to all aspects of the System Software. The intent of this Specification is to require a graphic package that provides for intuitive operation of the systems without extensive training and experience. It shall facilitate logical and simple system interrogation, modification, configuration, and diagnosis. The Operator Interface shall provide for overall system supervision, graphical user interface, management report generation, alarm annunciation, and remote monitoring. The system shall be capable of supporting an unlimited number of clients.
  4. The number of network controllers required is dependent on the type and quantity of devices installed. It is the responsibility of the Contractor to determine the quantity and type of devices. The Contractor shall be responsible to properly install the correct number (increase if required) of network controllers from the designed minimum shown on the BAS documents. The Contractor shall confirm the designed network load and architecture with the capabilities of the selected Network Controller. If network communications issues arise as a result of a limited Network Controller resource count the Network Integrator shall furnish, install, and implement additional Network Controllers to reduce the network traffic on each Network Controllers Local Operating Network to less than 50% of maximum bandwidth as recommended by the manufacturer. The total capacity includes all imbedded applications as well as design specific applications.
  5. The web browser GUI shall be HTML5 compatible and provide an interactive user interface and must offer and be configured with the following features as a minimum:
    - a. Trending.
    - b. Scheduling.
    - c. Real time 'live' Graphic Programs.
    - d. Tree Navigation.
    - e. Parameter change of properties.
    - f. Set-point Adjustments.
    - g. Alarm / Event information.
  6. Software Components: All software components of the BAS system software shall be provided and installed as part of this project. BAS software components shall include:
    - a. System Configuration Utilities for future modifications to the system, and controllers shall include all software and programming not specifically itemized in these specifications, which is necessary to implement, maintain, operate, and diagnose the system in compliance with these Specifications.
    - b. Graphical Programming Tools.
    - c. Direct Digital Control Software.
    - d. Application Software.

**B. General:**

1. All necessary software to form a complete operating system as described in this specification shall be provided.
2. The software programs specified in this Section shall be provided as an integral part of DDC Controllers and shall not be dependent upon any higher level computer for execution.
3. All digital points shall have user defined two-state status indication (descriptors with minimum of 8 characters allowed per state (i.e. summer/winter).
4. All subsystems that can stop or disrupt the program shall be graphically displayed as red/green status.

5. The software shall be provided with an interactive HELP function to assist operators with syntax, abbreviations, commands and saving programs.

C. Control Software Description:

1. The DDC Controllers shall have the ability to perform the following pre-tested control algorithms:
  - a. Two-position control.
  - b. Proportional control.
  - c. Proportional plus integral control.
  - d. Proportional, integral, plus derivative control.
  - e. Automatic tuning of control loops.
2. Control sequence shall include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.
3. The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads.
4. Upon the resumption of normal power, each DDC Controller shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling and turn equipment on or off as necessary to resume normal operations.

D. Scheduling:

1. Building controllers must store and use operating schedules. BACnet schedules are preferred.
2. Schedules shall reside in the building controller and shall not rely on external processing or network.
3. It shall be possible to define a group of objects as a custom event (i.e., meeting, athletic activity, etc.). Events can then be scheduled to operate all necessary equipment automatically.
4. For points assigned to one common load group, it shall be possible to assign variable time delays between each successive start and/or stop within that group.
5. The operator shall be able to define the following information:
  - a. Time, day.
  - b. Commands such as on, off, auto, etc.
  - c. Time delays between successive commands.
  - d. There shall be provisions for manual overriding of each schedule by an authorized operator.
6. It shall be possible to schedule calendar-based events up to one year in advance based on the following:
  - a. Weekly Schedule. Provide separate schedules for each day of the week. Each of these schedules should include the capability for start, stop, optimal start, optimal stop, and night economizer. When a group of objects are scheduled together as an Event, provide the capability to adjust the start and stop times for each member.
  - b. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed, it will be discarded and replaced by the standard schedule for that day of the week.

7. Schedule Categories: The system shall allow operators to define and edit scheduling categories (for example, lighting, HVAC occupancy, etc.). Unless otherwise defined in the project documents, separate schedules should be defined for:
  - a. AHU Occupancy.
  - b. VAV Occupancy.
  - c. Exterior Lighting Schedule.
  - d. Interior Lighting Schedule.
  
- E. DDC Controllers shall have the ability to perform all the following energy management routines:
  1. Time-of-day scheduling.
  2. Calendar-based scheduling.
  3. Holiday scheduling.
  4. Temporary schedule overrides.
  5. Start-Stop Time Optimization.
  6. Automatic Daylight Savings Time Switchover.
  7. Night setback control.
  8. Enthalpy switchover (economizer).
  9. Peak demand limiting.
  10. Temperature-compensated duty cycling.
  11. Fan speed/CFM control (reducing fan speed on CV AHU to save demand charges).
  12. Heating/cooling interlock (to prevent system overlap).
  13. Hot water reset.
  14. Chilled water reset.
  15. Condenser water reset.
  16. Equipment sequencing.
  17. Supply air reset.
  18. Control Loop Algorithm.
  19. Adaptive Loop Tuning.
  20. Generator load shedding/starting sequence.

NOTE: FOR EXAMPLE, PUMP, AND CHILLER SEQUENCING TO REDUCE PEAK DEMAND. INCLUDE IN SEQUENCE OF OPERATIONS. PROVIDE FOR RAMPING DOWN CHILLERS WHEN ANOTHER CHILLER IS BROUGHT ONLINE TO REDUCE PEAK DEMAND

  - a. All programs shall be executed automatically without the need for operator intervention and shall be flexible enough to allow user customization. Programs shall be applied to building equipment as described in the Sequence of Operations.
  
- F. DDC Controllers shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.
  1. It shall be possible to use any of the following in a custom process:
    - a. Any system measured point data or status.
    - b. Any calculated data.
    - c. Any results from other processes.
    - d. User-defined constants.
    - e. Arithmetic functions (+, - \* /, square root, exp, etc.).
    - f. Boolean logic operators (and/or, exclusive or, etc.).
    - g. On-delay/off-delay/one-shot timers.

2. Custom processes may be triggered based on any combination of the following:
    - a. Time interval.
    - b. Time-of-day.
    - c. Date.
    - d. Other processes.
    - e. Time programming.
    - f. Events (e.g., point alarms).
  3. A single process shall be able to incorporate measured or calculated data from any and all other DDC Controllers on the network. In addition, a single process shall be able to issue commands to points in any and all other DDC Controllers on the network.
  4. Processes shall be able to generate operator messages and advisories to operator I/O devices. A process shall be able to directly send a message to a specified device or cause the execution of a dial-up connection to a remote device such as a printer or pager.
  5. The custom control programming feature shall be documented via English language descriptors. The document shall include plain English version of programming for a clear understanding of code and the program. It shall also include a layman's description of the sequence and a flow chart for a non-programmers interpretation.
  6. DDC and HVAC Mechanical Equipment Controller shall be capable of comment lines for sequence of operation explanation.
  7. Programming shall provide owner with the ability to override reset schedules per point at all user interfaces.
- G. A variety of historical data collection utilities shall be provided to manually or automatically sample, store and display system data for points as specified in the I/O summary.
1. DDC Controllers shall store point history data for selected analog and digital inputs and outputs:
    - a. Any point, physical or calculated may be designated for trending. Any point, regardless of physical location in the network, may be collected and stored in each DDC Controllers point group. Two methods of collection shall be allowed: either by a pre-defined time interval or upon a pre-defined change of value. Sample intervals of 1 minute for a 24-hour period shall be provided. Each DDC Controller shall have a dedicated RAM based buffer for trend data and shall be capable of storing a minimum of 25,000 data samples. Provide additional RAM capacity internal or external to the DDC Controller as necessary to meet this requirement.
    - b. If buffer in each DDC Controller in a building over 100,000 square feet cannot store 25,000 data samples, provide additional Controllers in Mechanical Equipment Room to obtain required minimum data storage.
  2. Trend data shall be stored at the DDC Controllers and uploaded to the server when retrieval is desired. Uploads shall occur based upon either user-defined interval, manual command or when the trend buffers are full. All trend data shall be available for use in 3rd party personal computer applications.
- H. DDC Controllers shall have the capability to automatically accumulate and store run-time hours for digital input and output points as specified in the point I/O summary.
1. The totalization routine shall have a sampling resolution of one minute or less.
  2. The user shall have the ability to define a warning limit for runtime totalization. Unique, user-specified messages shall be generated when the limit is reached.



- I. DDC Controllers shall have the capability to automatically sample, calculate and store consumption totals on a daily, weekly or monthly basis for user-selected analog and digital pulse input type points as specified in the point I/O summary.
  - 1. Totalization shall provide calculation and storage of accumulations of up to 99,999.9 units (e.g., KWH, gallons, BTU, tons, etc.).
  - 2. The totalization routine shall have a sampling resolution of one minute or less.
  - 3. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.
  
- J. DDC Controllers shall have the ability to count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be performed on a daily, weekly or monthly basis for points as specified in the point I/O summary.
  - 1. The event totalization feature shall be able to store the records associated with a minimum of 9,999.9 events before reset.
  - 2. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.
  
- K. The network shall allow the DDC Controllers to access any data from or send control commands and alarm reports directly to any other DDC and HVAC Mechanical Equipment Controller or combination of controllers on the network without dependence upon a central or intermediate processing device. DDC and HVAC Mechanical Equipment Controllers shall send alarm reports to multiple workstations without dependence upon a central or intermediate processing device. The peer-to-peer network shall also allow any DDC and HVAC Mechanical Equipment Controller to access, edit, modify, add, delete, back up, and restore all system point database and all programs.
  
- L. System Security: System shall be capable of multi-level access through Login Name and Password. Access to different areas of the BAS system shall be defined in terms of Roles, Privileges and geographic area of responsibility as specified:
  - 1. User access shall be secured using individual security passwords and user names.
  - 2. Passwords shall restrict the user to the objects, applications, and system functions as assigned by the system manager.
  - 3. Building Controllers shall be able to assign a minimum of 50 passwords access and control priorities to each point individually. The logon password (at any Operator Interface or portable operator terminal) shall enable the operator to monitor, adjust and control only the points that the operator is authorized for. All other points shall not be displayed at the Operator Interface or portable terminal. Passwords and priorities for every point shall be fully programmable and adjustable.
  - 4. User Log On/Log Off attempts shall be recorded.
  - 5. The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user-definable.
  - 6. Use of workstation resident security as the only means of access control is not an acceptable alternative to resident system security in the DDC controller software.
  
- M. Alarm Management:
  - 1. Alarm management shall be provided within the controller software to monitor and direct alarm information to operator devices.
  - 2. Each Building Controller shall perform distributed, independent alarm analysis, minimize network traffic and prevent alarms from being lost. At no time shall the Building Controllers ability to report alarms be affected by either operator or activity at a PC workstation, local I/O device or communications with other panels on the network.

3. Conditional alarming shall allow generation of alarms based upon user defined multiple criteria.
4. An Alarm “shelving” feature shall be provided to disable alarms during testing. (Pull the Plug, etc.).
5. Binary Alarms. Each binary alarm object shall be set to alarm based on the operator-specified state. Provide the capability to automatically and manually disable alarming.
6. Analog Alarms. Each analog alarm object shall have both high and low alarm limits. Alarming must be able to be automatically and manually disabled.
7. All alarm shall include the point's user-defined language description and the time and date of occurrence.
8. Alarm reports and messages shall be routed to user-defined list of operator workstations, or other devices based on time and other conditions. An alarm shall be able to start programs, print reports, be logged in the event log, generate custom messages, and display graphics.
9. The user shall be able to add a 200-character alarm message to each alarm point to more fully describe the alarm condition or direct operator response. Each Building Controller shall be capable of storing a library of at least 50 alarm. Each message may be assigned to any number of points in the Controller.
10. Operator-selected alarms shall be capable of initiating a trigger to an advanced annunciation, such as text, email, etc.
11. An alarm history log shall report the start of the alarm condition, acknowledgement by a user and return of the alarm to normal condition.

Point Summary Table - Example	
(Transpose for a single point per row format)	
Equipment Code	SAT
*Point Name (Object Name)	LIB04_1000a_AH031_SAT
*Point Description (Object Description)	AH031 Supply Air Temperature
Object Type	AI
Engineering Units	Deg F
Network Variable	SNVT_temp
*Represents information that shall reside in the relevant property for the object	

- N. Trends: Trends shall both be displayed and user configurable through the Web Browser GUI or thick client. Trends shall be capable on all analog, digital, calculated, and integrated points. A trend log's properties shall be editable using the Navigation Tree and Graphic Pane. Trends must be user configurable from the thick/thin client including creating new trends on all connected items. Trends that must be set up with a separate configuration tool are NOT acceptable.
1. Viewing Trends: The operator shall have the ability to view trends by using the Navigation Tree and selecting a Trends button in the Graphic Pane located on every page. The system shall allow y- and x-axis maximum ranges to be specified and shall be able to simultaneously graphically display multiple trends per graph.
  2. Local Trends: Trend data shall be collected locally by a Controller located in the building, and periodically uploaded to the BAS server if historical trending is enabled for the object. Trend data, including run time hours and start time date shall be retained in non-volatile module memory. Systems that rely on a gateway/router to run trends are NOT acceptable.
  3. Server/Long Term Trends: Trend data shall be collected periodically by the server and must have demonstrable capability of storing for a minimum of 2 years. Server must

- provide the ability to easily download at least 2 years' worth of data for multiple points simultaneously to a .csv or Microsoft Excel file with one export.
4. Events: Events shall be logged for review by the operator, engineering or management personnel. The system shall log each new operator log-on, and whenever an operator changes a set-point or turns any device on or off. Each time the event log records an event, it will record the operator logged in and the type of action taken (set-point change, state change, etc.), along with a date and time stamp.
  5. Resolution. Sample intervals shall be as small as one second. Each trended point will have the ability to be trended at a different trend interval. When multiple points are selected for displays that have different trend intervals, the system will automatically scale the axis.
  6. Dynamic Update. Trends shall be able to dynamically update at operator-defined intervals.
  7. Zoom/Pan. It shall be possible to zoom-in on a particular section of a trend for more detailed examination and 'pan through' historical data by simply scrolling the mouse.
  8. Numeric Value Display. It shall be possible to pick any sample on a trend and have the numerical value displayed.
  9. Copy/Paste. The operator must have the ability to pan through a historical trend and copy the data viewed to the clipboard using standard keystrokes (i.e. CTRL+C, CTRL+V).
- O. Graphical User Interface.
1. Web Browser Navigation: The Thin Client web browser GUI shall provide a comprehensive user interface. Using a collection of web pages, it shall be constructed to "feel" like a single application and provide a complete and intuitive mouse/menu driven operator interface. It shall be possible to navigate through the system using a web browser to accomplish requirements of this specification. The Web Browser GUI shall (as a minimum) provide for navigation, and for display of animated graphics, schedules, alarms/events, live graphic programs, active graphic setpoint controls, configuration menus for operator access, reports, and reporting actions for events and trends.
  2. Login: On launching the web browser and selecting the appropriate domain name or IP address, the operator shall be presented with a login page that will require a login name and password. Navigation in the system shall be dependent on the operator's role privileges.
  3. Navigation: Navigation through the GUI shall be accomplished by clicking on appropriate level of a navigation tree (consisting of expandable and collapsible tree control like Microsoft's Explorer program), and/or by selecting dynamic links to other system graphics. Both the navigation tree and action pane shall be displayed simultaneously, enabling the operator to select a specific system or equipment, and view the corresponding graphic.
  4. Actions: The web interface shall provide several functional views for each HVAC or mechanical/electrical subsystem specified. A functional view shall be accessed by clicking on the corresponding button:
    - a. Graphics: Using graphical format suitable for display in a web browser, graphics shall include, color building floor-plans, equipment drawings, active graphic set-point controls, web content and other valid HTML elements. Real-time values displayed on a Web page shall update automatically without requiring a manual "refresh" of the Webpage.
    - b. Properties: Shall include graphic controls and text for the following: Locking or overriding objects, demand strategies, and any other valid data required for setup. Changes made to the properties pages shall require the operator to depress an 'accept/cancel' button.
    - c. Schedules: Shall be used to create, modify/edit and view schedules based on the systems geographical hierarchy (using the navigation tree). The Web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc., and provide the same interface methodology as is provided by the Graphical User Interface. Systems that require different views or that require

different means of interacting with objects such as schedules, or logs, shall not be permitted.

- d. Alarms: Shall be used to view alarm information geographically (using the navigation tree), acknowledge alarms, sort alarms by category, actions and verify reporting actions.
- e. Trends: Shall be used to display associated trend and historical data, modify colors, date range, axis and scaling.

## 2.6 BUILDING CONTROLLER

- A. The Building Controller shall be able to operate as a standalone panel and shall not be dependent upon any higher level computer or another controller for operation. The controller Controllers shall combine both network routing functions, control functions, and server functions into a single unit. The controller shall be multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules. Controller size shall be sufficient to fully meet the requirements of this specification and the attached point list. Schedules shall reside in the building controller and only rely on the central server for updates.
- B. The Building controller shall be classified as a “native” BACnet device, supporting the BACnet Network Server Controller (B-BC) profile. NSCs shall be tested and certified by the BACnet Testing Laboratory (BTL) as BACnet Network Server Controllers (B-BC).
- C. Each DDC controller shall have a manual override point present on the controller so that the equipment may be operated directly from the controller.
- D. This level of controller shall be used for the following types of systems:
  - 1. Chiller plant systems.
  - 2. Heating plant systems.
  - 3. Cooling Towers.
  - 4. Pumping systems.
  - 5. Air handlers.
  - 6. Systems with over 24 input/output points.
- E. Computing power and memory minimum:
  - 1. A 32-bit, stand-alone, multi-tasking, multi-user, real-time 100MHz digital control microprocessor module.
  - 2. Inputs shall be 16-bit minimum analog-to-digital resolution.
  - 3. Outputs shall be 10-bit minimum digital-to-analog resolution.
  - 4. Memory module (24 Megabyte, minimum) to accommodate all Primary Control Panel software requirements, including but not limited to, its own operating system and databases (see Controllers Software section), including control processes, energy management applications, alarm management applications, historical/trend data for points specified, maintenance support applications, custom processes, operator I/O, dial-up communications.
  - 5. Real time clock and battery.
  - 6. Data collection/ Data Trend module sized for 10,000 data samples.
  - 7. Flash Memory Firmware: Each Building Level Control Panel shall support firmware upgrades without the need to replace hardware.
- F. Onboard or Modular hardware and connections:

1. Primary Network communication module for primary network communications.
  2. Secondary Network communication module for secondary network communications.
  3. RJ45 port: Minimum 10/100Mbaud.
  4. RS485 ports for subnetworks and point expansion.
  5. Human Machine Interface port (HMI).
  6. USB Port.
- G. Input and Output Points Hardware:
1. Input/output point modules as required including spare capacity.
  2. Monitoring of the status of all hand-off-auto switches.
  3. Monitoring of all industry standard types of analog and digital inputs and outputs, without the addition of equipment to the primary control panel.
  4. Local status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device. Each primary control panel shall perform diagnostics on all inputs and outputs and a failure of any input or output shall be indicated both locally and at the operator workstation.
  5. Graduated intensity LEDs or analog indication of value for each analog output.
- H. Each DDC Controller shall support:
1. Monitoring of the following types of inputs, without the addition of equipment outside the DDC Controller cabinet:
    - a. Analog inputs.
      - 1) 4-20 mA.
      - 2) 0-10 Vdc.
      - 3) Thermistors.
      - 4) 1000 ohm RTDs.
    - b. Digital inputs.
      - 1) Dry contact closure.
      - 2) Pulse Accumulator.
      - 3) Voltage Sensing.
  2. Direct control of electronic actuators and control devices. Each DDC Controller shall be capable of providing the following control outputs without the addition of equipment outside the DDC Controller cabinet:
    - a. Digital outputs (contact closure).
      - 1) Contact closure (motor starters, sizes 1-4).
    - b. Analog outputs.
      - 1) 4-20 mA.
      - 2) 0-10 Vdc.
- I. Each DDC Controller / network router shall have a minimum of 10% spare capacity for future point connection. The type of spares shall be in the same proportion as the implemented I/O functions of the panel, but in no case shall there be less than two spares of each implemented I/O type. Provide all processors, power supplies and communication controllers complete so that the

implementation of a point only requires the addition of the appropriate point input/output termination module and wiring.

1. Provide sufficient internal memory for the specified control sequences and have at least 25% of the memory available for future use.
- J. Each DDC Controller shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all panel components. The DDC Controller shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.
- K. In the event of the loss of normal power, there shall be an orderly shutdown of all DDC Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 60 days. Controls Contractor shall provide external battery back-up, if necessary to meet this requirement.
1. Upon restoration of normal power, the DDC Controller shall automatically resume full operation without manual intervention.
- L. Building Level Controllers shall have the capability to serve as a gateway between Modbus subnetworks and BACnet objects. Provide software, drives and programming.
- M. Isolation shall be provided at all primary control panel terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standards 587-1980.
- N. Code compliance:
1. Approvals and standards: UL916; CE; FCC.
  2. Provide UL864-UUKL where called for in the sequences of operations.
- O. Accessories:
1. Appropriate NEMA rated metal enclosure.
  2. Power supplies as required for all associated modules, sensors, actuators, etc.
- P. The operator shall have the ability to manually override automatic or centrally executed commands at the primary control panels via local, point discrete, on-board hand/off/auto operator override switches. If on board switches are not available, provide separate control panels with HOA switches. Mount panel adjacent to primary control panel. Provide hand/off/auto switch for each digital output, including spares.
- Q. Environment.
1. Controller hardware shall be suitable for the anticipated ambient conditions.
  2. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 0°C to 49°C (32°F to 120°F).
  3. Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 49°C (32°F to 120°F).
- R. Immunity to power and noise.
1. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage.

2. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).
  3. Isolation shall be provided at all primary network terminations, as well as all field point terminations to suppress induced voltage transients consistent with:
    - a. RF-Conducted Immunity (RFCI) per ENV 50141 (IEC 1000-4-6) at 3V.
    - b. Electro Static Discharge (ESD) Immunity per EN 61000-4-2 (IEC 1000-4-2) at 8 kV air discharge, 4 kV contact.
    - c. Electrical Fast Transient (EFT) per EN 61000-4-4 (IEC 1000-4-4) at 500V signal, 1 kV power.
    - d. Output Circuit Transients per UL 864 (2,400V, 10A, 1.2 Joule max).
  4. Isolation shall be provided at all Building Controller's AC input terminals to suppress induced voltage transients consistent with:
    - a. IEEE Standard 587 1980.
    - b. UL 864 Supply Line Transients.
    - c. Voltage Sags, Surge, and Dropout per EN 61000-4-11 (EN 1000-4-11).
- S. Provide a separate DDC Controller for each HVAC system as indicated on the drawings and in the input/output summary, Section 1.15. It is intended that each unique system be provided with its own point resident DDC Controller.

## 2.7 APPLICATION SPECIFIC CONTROLLERS (ASC)

- A. Each Application Level Control Panel shall operate as a stand-alone controller capable of performing its user selectable control routines independently of any other controller in the system. Each application specific controller shall be a microprocessor-based, multi-tasking, real-time digital control processor.
- B. Each DDC Controller shall be able to extend its performance and capacity through the use of remote application specific controllers (ASCs).
- C. The Application Controller Software shall be capable of BACnet communications. The BACnet Advanced Application Controller (B-AAC) shall have demonstrated compliance to BTL through BTL listing and shall substantially conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135-2004 or ANSI/ASHRAE 135-2008. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network.
- D. Communication:
  1. BAS Network: The Advanced Application Controller shall support the following Data Link Layers.
    - a. BACnet MS/TP Master or slave.
    - b. Modbus.
    - c. BACnet IP (On dedicated BMS sub-network).
- E. Provide an Application Specific Control Panel for each of the following types of equipment (if applicable):
  1. Constant Air Volume (CAV) boxes.
  2. Duct mounted reheat coils.

3. Fan coil Units.
4. Fan Powered Variable Air Volume (VAV) Boxes.
5. Reheat Coils.
6. Supplemental AC units.
7. Variable Air Volume (VAV) Boxes.
8. Other terminal equipment.

F. Terminal Equipment Controllers (VAV Controllers):

1. Provide for control of each piece of equipment, including, but not limited to, the following:  

DESIGNER SHALL: ADD OR DELETE EQUIPMENT TYPES FOR SPECIFIC PROJECT
2. Controllers shall include all point inputs and outputs necessary to perform the specified control sequences. As a minimum, 50% of the point outputs (except for unit ventilator controllers) shall be of the Universal type; that is, the outputs may be utilized either as modulating or two-state, allowing for additional system flexibility. In lieu of Universal outputs, provide a minimum of 50% spare outputs of each type via additional point termination boards or controllers. Analog outputs to field devices shall be either 4 to 20 ma or 1 to 10 volt. Tri-state signals (floating control) shall not be acceptable. Terminal equipment controllers utilizing proprietary control signals and actuators shall not be acceptable. As an alternative, provide DDC Controllers or other ASCs with industry standard outputs for control of all terminal equipment.
3. Each controller performing space temperature control shall be provided with a matching room temperature sensor. The sensor may be either RTD or thermistor type providing the following minimum performance requirements are met:
  - a. Accuracy:  $\pm 1^{\circ}\text{F}$
  - b. Operating Range:  $0^{\circ}$  to  $115^{\circ}\text{F}$
  - c. Set Point Adjustment Range:  $55^{\circ}$  to  $95^{\circ}\text{F}$
  - d. Set Point Modes
    - 1) Independent Heating, Cooling,
    - 2) Night Setback Heating, Night Setback Cooling
  - e. Calibration Adjustments: None required.
  - f. Installation: Up to 150 ft. from Controller.
  - g. Each room temperature sensor shall include a terminal jack integral to the sensor assembly. The terminal jack shall be used to connect a portable operator's terminal to control and monitor all hardware and software points associated with the controller. In lieu of an internal jack, provide a method for local communications to controller without the need for outside network or provide a separate terminal jack mounted on a stainless steel wall plate adjacent to the sensor to facilitate direct access to the controller via the terminal.
  - h. Each room sensor shall also include the following auxiliary devices:
    - 1) Setpoint Adjustment Dial.
    - 2) Temperature Indicator.
    - 3) Override Switch.
  - i. The setpoint adjustment dial shall allow for modification of the temperature by the occupant Setpoint adjustment may be locked out overridden or limited as to time or temperature through software by an authorized operator at the central workstation, DDC Controller, or via the portable operator's terminal. In lieu of an integral



- adjustment dial, provide a separate dial mounted on a stainless steel wall plate adjacent to the sensor to perform the specified functionality.
- j. The temperature indicator shall be a digital readout and have the ability to indicate at minimum current temperature and temperature setpoint.
  - k. An override switch shall initiate override of the night setback mode to normal (day) operation when activated by the occupant. The override function may be locked out, overridden or limited as to the time through software by an authorized operator at the central workstation, DDC Controller or via the portable operator's terminal. In lieu of an integral switch, provide a separate momentary contact switch mounted on a stainless steel wall plate adjacent to the sensor to perform the specified functionality.
4. Each controller shall perform its primary control function independent of other DDC Controller LAN communication, or if LAN communication is interrupted. Reversion to a fail-safe mode of operation during LAN interruption is not acceptable. The controller shall receive its real-time data from the DDC Controller time clock to ensure LAN continuity. Each controller shall include algorithms incorporating proportional, integral and derivative (PID) gains for all applications. All PID gains and biases shall be field-adjustable by the user via terminals as specified herein. This functionality shall allow for tighter control of space conditions and shall facilitate optimal occupant comfort and energy savings. Controllers that incorporate proportional and integral (PI) control algorithms only shall not be acceptable.
  5. Provide each terminal equipment controller with sufficient memory to accommodate point databases, operating programs, local alarming and local trending. All databases and programs shall be stored in non-volatile EEPROM, EPROM and PROM, or minimum of 72-hour battery backup shall be provided. The controllers shall be able to return to full normal operation without user intervention after a power failure of unlimited duration. Provide uninterruptible power supplies (UPSs) of sufficient capacities for all terminal controllers that do not meet this protection requirement. Operating programs shall be field-selectable for specific applications. In addition, specific applications may be modified to meet the user's exact control strategy requirements, allowing for additional system flexibility. Controllers that require factory changes of all applications are not acceptable.
  6. Programming and/or configurations should be editable over the network from the standard thin or thick client software.
  7. Variable Air Volume (VAV) Box Controllers: shall support the following types of pressure independent terminal boxes as a minimum:
    - a. VAV cooling only.
    - b. Fan-powered VAV with hot water reheat.
  8. All VAV box control applications shall be field-selectable such that a single controller may be used in conjunction with any of the above types of terminal units to perform the specified sequences of control. This requirement must be met in order to allow for future design and application changes and to facilitate system expansions. Controllers that require factory application changes are not acceptable.
  9. The VAV box controllers shall be powered from a 24 VAC source and shall function normally under an operating range of 18 to 28 VAC (-25% to +17%), allowing for power source fluctuations and voltage drops. The BAS contractor shall provide a dedicated power source and separate isolation transformer for each controller. The controllers shall also function normally under ambient conditions of 32° to 122°F and 10% to 95%RH (non-condensing). Provide each controller with a suitable cover or enclosure to protect the intelligence board assembly.
  10. The controller shall include a differential pressure transducer that shall connect to the terminal unit manufacturer's standard averaging air velocity sensor to measure the average differential pressure in the duct. The controller shall convert this value to actual airflow. Single point air velocity sensing is not acceptable. The differential pressure transducer shall

have a measurement range of 0 to 4000 fpm and measurement accuracy of 5% at 400 to 4000 fpm, ensuring primary air flow conditions shall be controlled and maintained to within 5% of setpoint at the specified parameters. The BAS contractor shall provide the velocity sensor if required to meet the specified functionality.

11. Each controller shall include provisions for manual and automatic calibration of the differential pressure transducer in order to maintain stable control and insuring against drift over time. Calibration shall be accomplished by stroking the terminal unit damper actuator to a 0% position so that a 0 cfm air volume reading is sensed. The controller shall automatically accomplish this whenever the system mode switches from occupied to unoccupied or vice versa. Manual calibration may be accomplished by either commanding the actuator to 0% via the POT or by depressing the room sensor override switch. Calibration of the transducer at the controller location shall not be necessary.
12. Damper actuator should provide indication of damper position. Active proportional feedback or calculated position shall be available. Specific damper position shall be controllable. If calculated position is used, this controller must self-calibrate on a daily basis and be set up for off-hours calibration. Floating point damper actuators which do not allow position control are not acceptable.
13. The VAV box controller shall interface to a matching room temperature sensor as previously specified. The controller shall function to maintain space temperature to within 1.5°F of setpoint at the room sensor location.
14. Each controller performing space heating control shall incorporate an algorithm allowing for modulation of a hot water reheat valve as required to satisfy space heating requirements. Each controller shall also incorporate an algorithm that allows for resetting of the associated air handling unit discharge temperature if required to satisfy space cooling requirements. This algorithm shall function to signal the respective DDC Controller to perform the required discharge temperature reset in order to maintain space temperature cooling setpoint.
15. Each controller shall have a discharge air temperature sensor on the VAV box for system operator to use for diagnostics.

## 2.8 BUILDING SYSTEMS INTEGRATION

- A. The BAS System shall establish a seamless interconnection with other building, electrical and/or mechanical subsystems that employ BACnet protocol (Chillers, Variable frequency drives, etc.). These systems shall be controlled, monitored and graphically programmed with the same Graphical Programming Language (GPL) used for all other control modules.
- B. Variable Frequency Drive Integration
  1. VFDs should be controlled via hardwired operation including Enable, speed, alarm points.
  2. Unless specifically noted on the drawings, the motor/fan/pump status should be monitored separately through a current transducer.
  3. VFDs shall have modbus/BACnet capabilities - the drives should be integrated into the control system and points should be available on the controls system.
  4. At a minimum the following BACnet points shall be integrated: Actual drive speed (hz), Motor Current (A-avg), Motor Voltage (V-rms), Driver Power (kW), Drive Energy (kWh) Alarms. Drive Power should be converted to kW if not available as BACnet point.
- C. Chillers And Boiler Integration
  1. Chillers and Boilers should be controlled via hardwired operation including Enable, setpoint, firing rate and alarm points.
  2. Chillers and Boilers shall have modbus/BACnet capabilities - the chiller/boilers should be integrated into the control system and points should be available on the controls system.

3. At a minimum, the following Boiler points shall be integrated: Setpoint (F), Inlet Temp (F), Outlet Temp (F), Flue Temp (F), Firing Rate (%), Boiler Pump Status, Boiler Pump Speed (%), Alarm, Alarm Code
4. At a minimum, the following Chiller points shall be integrated: Setpoint (F), Chiller Status, Chiller Operating Mode, Operating Capacity (%), Compressor Speed (%), Compressor Status (each), Inlet Temp (F), Outlet Temp (F).

D. Lighting Control System Integration

1. Where lighting controllers are to be integrated through a dry-contact, the relay should have hand/on/auto switch for local override
2. Where lighting controllers are to be integrated through modbus/BACnet – the lighting control panel should be integrated into the control system and points should be available on the controls system.

2.9 CONTROL PANELS

- A. Controllers in mechanical rooms shall be mounted in a minimum of NEMA 1 enclosures.
- B. Mount on walls at an approved location or provide a free standing rack built of unistrut or hot dipped galvanized of sufficient strength to maintain rigidity.
- C. Panels shall be constructed of 16 gauge, furniture-quality steel, or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with ANSI 61 gray polyester-powder painted finish, UL listed. Provide common keying for all panels.
- D. Provide power supplies for control voltage power.
- E. Dedicate 1 power supply to the DDC controller. Other devices shall be on a separate power supply, unless the power for the control device is derived from the controller terminations.
- F. Power supplies for controllers shall be a transformer with a fuse or circuit breaker. Power supplies for other devices can be plain transformers.
- G. All power supplies for 24V low voltage wiring shall be class 2 rated and less than 100VA. If low voltage devices require more amps, then provide multiple power supplies. If a single device requires more amps, then provide a dedicated power supply in a separate enclosure and run a separate, non-class 2 conduit to the device.
- H. Surge transient protection shall be incorporated in design of system to protect electrical components in all DDC Controllers and operator's workstations.
- I. All devices in a panel shall be permanently mounted, including network switches, modems, media converters, etc.
- J. Provide a pocket to hold documentation.
- K. Wire management should be completed using covered, slotted wireway (Panduit) in the control panels. Panels should be sized to accommodate wireways and DIN rail mounted equipment as necessary. Wires should not be left hanging.

2.10 INPUT/OUTPUT SENSORS

A. Temperature:

1. Unless otherwise stated in this specification temperature sensors to be platinum RTD type.
2. Resistance tolerance at calibration point to be no more than 0.2% Calibration point 0 degrees F.
3. Use insertion elements in ducts not affected by temperature stratification or smaller than one square meter. Use averaging elements where larger or prone to stratification, sensor length 18" to 25 ft as required.
4. Insertion elements for liquids shall be brass or stainless steel with minimum insertion length of 2-1/2 inches.
5. Room temperature sensors used with terminal equipment controllers to be either thermistor or RTD type with set-point adjustment, temperature indicator, terminal jack and over-ride switch. Refer to Terminal Equipment Controller Specification for detailed requirements.
6. Provide outside air sensors with watertight inlet fitting, shielded from direct rays of sun.

B. Humidity Sensors:

1. Elements: Accurate within 5 percent over 20-95% RH range with linear output.
2. Room Sensors: Range of 0-99 percent RH.
3. Duct and Outside Air Sensors: With element guard and mounting plate, range of 0-99 percent relative humidity.

C. Dew Point Temperature / Humidity Sensor:

1. Duct type shall include a dew point probe with an adjustable/removable draft shield and a transmitter mounted to the sensor probe case.
2. Outside Air type shall include a probe in a weather-proof housing and a transmitter for indoor mounting.
3. Dew Point monitoring range -40 to +115 degrees F, dewpoint.
4. Relative Humidity 12% to 99% RH.
5. Output signal 4-20MA DC.
6. Accuracy at Calibration Point.
  - a. Dewpoint Element +-1.1 degrees F, dewpoint.
  - b. Dewpoint Sensor +- 1.5 degrees F, dewpoint.
7. Voltage, probe heater - 120 Vac.
8. Voltage, transmitter - 26 Vdc.

D. Static Pressure Sensors:

1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
2. Temperature compensated with typical thermal error of .015 percent of full scale per degree F. in temperature range of 35 to 135 degrees F.
3. Accuracy: One percent of full scale with repeatability 0.3 percent.
4. Output: 0-10 Vdc or 4-20ma with power at 13 to 36 vdc.

E. Equipment Operation Sensors:

1. Status Inputs for Fans: Current sensitive relay with current transformers, adjustable and set to 175 percent of rated motor current.

2. Status Inputs for Pumps: Differential pressure switch piped across pump with adjustable pressure differential range of 8 to 60 psi and on the pump side from any check valve or triple duty valve.
3. Status Inputs where differential pressure sensing is impractical: Current sensitive relay with current transformers, adjustable and set to 175 percent of rated motor current.

F. Low Temperature Protection Thermostats:

1. Low temperature protection thermostats shall be the manual reset type and shall have sensing elements not less than 20 feet in length. The thermostat shall operate in response to the coldest temperature at other parts of the element. The element shall be properly supported to cover the entire duct width. Separate thermostats shall be provided for each 25 sq. ft. of coil face areas of fraction thereof.
2. Low temperature protection thermostats shall be installed such that freezestats do not trip during normal operation of the system.
3. Controls should be programmed such that freezestats do not trip during normal winter operation.
4. Controls should be programmed such that freezestats do not trip during smoke evacuation operation. This is usually accomplished by automatically opening the hot water valves on the hot water coils during operation of the smoke evacuation system.

G. Carbon Dioxide Sensor

1. CO2 sensor shall utilize Non-dispersive infrared technology (NDIR) repeatable.
2. Sensor repeatability shall be +/- 20 ppm, 0-2000.
3. Sensor accuracy shall be <= 75 ppm over 0-1500 ppm range.
4. Field selectable 4-20MA/0-5V/0-10V output with LCD display

2.11 CONTROL VALVES

A. Control Valves: Factory fabricated, of type, body material, and pressure class indicated. Where type or body material is not indicated, make selection as determined by manufacturer. For installation requirements and pressure class, based on maximum pressure and temperature rating of piping system.

B. Globe Pattern: As follows:

1. Up to 2 inches (DN 50): Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
2. Over 2 inches (DN 50): Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
3. Hydronic Systems: As follows:
  - a. Rating: Service at 125 psi WSP (862 kPa) and 250 deg F (121 deg C).
  - b. Internal Construction: Replaceable plugs and seats of stainless steel or brass.
    - 1) Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom of guided plugs.
    - 2) Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.
  - c. Sizing: 3-psi (21-kPa) maximum pressure drop at design flow rate.

- d. Flow Characteristics: 2-way valves have equal percentage characteristics; 3-way valves have linear characteristics. Select operators to close valves against pump shutoff head.
- 4. Butterfly Pattern: Iron body; bronze, aluminum-bronze, or stainless-steel disc; resilient, replaceable seat for service to 200 deg F (93 deg C) wafer or lug ends; extended neck.
  - a. Rating: Service at 125 psi WSP (862 kPa) and 250 deg F (121 deg C).
  - b. Sizing: 1-psi (7-kPa) maximum pressure drop at design flow rate.
- 5. Terminal Unit Control Valves: Bronze body, bronze trim, 2 or 3 port as indicated, replaceable plugs and seats, union and threaded ends.
  - a. Rating: Service at 125 psi WSP (862 kPa) and 250 deg F (121 deg C).
  - b. Sizing: 3-psi (21-kPa) maximum pressure drop at design flow rate, to close against pump shutoff head.
  - c. Flow Characteristics: 2-way valves have equal percentage characteristics; 3-way valves have linear characteristics.
  - d. Actuator : Proportional, modulating, self-contained – see VALVE AND DAMPER ACTUATORS

## 2.12 DAMPERS

- A. Dampers: AMCA-rated, opposed blade design; form frames from not less than 0.1084-inch (2.8-mm) galvanized steel with mounting holes for duct mounting; damper blades not less than 0.0635-inch (1.6-mm) galvanized steel, with maximum blade width of 8 inches (203 mm).
  - 1. Blades secured to 1/2-inch (13-mm) diameter, zinc-plated axles keyed, hexagonal square or other shape solid shaft that has positive (no slip) engagement with the provided actuator. Provided with zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass. Ends sealed against spring-stainless-steel blade bearings. Thrust bearings at each end of every blade.
  - 2. Operating Temperature Range: From -40 to 200 deg F (-40 to 93 deg C).
  - 3. For standard applications as indicated, (as selected by manufacturer's sizing techniques) with optional closed-cell neoprene edging.
  - 4. For low-leakage applications as indicated, provide parallel or opposed blade design (as selected by manufacturer's sizing techniques) with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 cfm/sq. ft. (51 L/s/sq. m) of damper area, at differential pressure of 4 inches wg (995 Pa) when damper is being held by torque of 50 inch-pounds (5.6 N x m); test in accordance with AMCA 500.
  - 5. Dampers shall be provided with mechanical end switches independent of the actuator position sensor to indicate a positive open or closed position of the damper blade itself.
  - 6. Parallel dampers only allowed for non-modulating (on/off) operation.
  - 7. Damper/Actuator combination shall be capable of modulating at maximum static pressure rating.

## 2.13 VALVE AND DAMPER ACTUATORS

- A. Basis of design: Belimo.
- B. Electronic Direct-Coupled. Electronic direct-coupled actuation shall be provided.

- C. Actuator Mounting. The actuator shall be direct-coupled over the shaft, enabling it to be mounted directly to the damper shaft. Where a shaft extension is required a manufactured option accessory shall be used. Field fabricated extensions and couplers will not be allowed. The actuator shall employ a V-bolt and toothed V-clamp fastening technique. Single point bolt or screw type fastener for circular valve and damper shafts is unacceptable.
- D. Electronic Overload Sensing. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the entire rotation of the actuator. Mechanical end switches or magnetic clutch to deactivate the actuator at the end of rotation are not acceptable.
- E. Power Failure/Safety Applications. For power failure/safety applications, an internal mechanical spring return mechanism shall be built into the actuator housing. Non- mechanical forms of fail-safe operation are not acceptable.
- F. Spring Return Actuators. All spring return actuators shall be capable of both clockwise and counterclockwise spring return operation by simply changing the mounting orientation.
- G. Proportional Actuators. Proportional actuators shall accept a 0 to 10VDC or 0 to 20mA control input and provide a 2 to 10VDC or 4 to 20mA operating range. An actuator capable of accepting a pulse width modulating control signal and providing full proportional operation of the damper is not acceptable.
- H. 24 Volts (AC/DC) actuators. All 24VAC/DC actuators shall operate on Class 2 wiring and shall not require more than 20VA for AC or more than 8 watts for DC applications. Actuators operating on 120VAC power shall not require more than 20VA. Actuators operating on 230VAC shall not be acceptable.
- I. Non-Spring Return Actuators. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators shall have a manual crank for this purpose.
- J. Modulating Actuators. All modulating actuators shall have an external, built-in switch to allow reversing direction of rotation.
- K. Conduit Fitting. Actuators shall be provided with a conduit fitting.
- L. U.L. Listing. Actuators shall be Underwriters Laboratories Standard 873 listed.
- M. Warranty. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque and shall have a minimum 5-year manufacturer's warranty.
- N. Actuators shall be selected utilizing no more than 80% of the cataloged torque rating.
- O. Actuators shall be electronic, low voltage (24 VAC/VDC), NEMA 2 rated for all applications. Two-position may utilize 120 VAC actuators. Actuators shall have UL, CSA and ISO 9001 certification and approvals. Actuators shall have a minimum operating range of  $-22^{\circ}$  to  $122^{\circ}$ F. Optional auxiliary switches shall be available if required by the sequence. Actuators shall be fully modulating/proportional, floating/tri-state, or two- position as required. Pulse width modulation is unacceptable. Actuators shall have visual position indicators. Proportional actuators shall be field programmable to operate in sequence with other devices without additional transducers. All actuators except two- position shall be capable of providing a constant rotation rate independent of the load. Actuators used on dampers or valves shall be designed to directly couple to a stem, shaft or ISO style-mounting pad. Damper actuators or damper actuators adapted for use with control valves shall utilize V-bolt toothed V-clamp shaft fastening technique. Single point, bolt, or

single screw type shaft fastening techniques for circular or round damper or valve shafts is unacceptable.

- P. Ganged actuators must allow for single point manual operation.

#### 2.14 METERS

- A. Hydronic Water Flow Metering – Hydronic heating and cooling: Provide insertion-type electromagnetic water flow meters equal to Dwyer IEF-S with remote display or engineer approved equal.
- B. Air Flow Monitoring Stations: Unless otherwise noted, monitor outdoor air volumes from duct mounted thermal dispersion air flow measurement systems. System shall employ bead in glass thermistor technology. Sensors shall be installed using an equal area sensor distribution. Thermistor signals shall be process by a 12 bit microprocessor based transmitter. Transmitter shall be 24vac powered. System shall be capable of processing any air flow rate from 0 to 5000FPM. Sensor accuracy shall be +/- 2% of reading with a +/- .25% repeatability. Sensors shall operate in conditions of -20° F to 160° F and 0 to 90% RH, non-condensing. Where indicated provide Air Flow Monitoring Station equal to Ebtron with remote indicating readout panels. Install readout panels a maximum of 6'-0" above the finished floor in the closest Mechanical Room.

#### 2.15 UTILITY METERING

- A. VFD sub-metering shall be monitored and measured by way of the BACnet or modbus output of the VFD.

#### 2.16 MISCELLANEOUS CONTROLS

- A. The control manufacturer shall furnish all two-position relays, current transformers, NEMA rated enclosures, thermostats and all other controls necessary to meet the specifications and provide for a properly operating automatic control system. All control devices connected in line-voltage circuits shall be U.L. listed and of a type to meet the current and voltage requirements of the particular application.
- B. If a device or piece of equipment is provided with the ability to communicate directly with the controls system through any form of communication protocol (such as BACnet or Lon) and the device is indicated to be connected to the BAS the controls contractor shall integrate their controls to that device.
- C. All low voltage communication and network wiring shall have orange jackets.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Verify that conditioned power supply is available to control units and operator workstation. Verify that field end devices and wiring are installed before proceeding with installation.



**3.2 INSTALLATION**

- A. Install equipment as indicated to comply with manufacturer's written instructions.
- B. Install software in control units and operator workstation. Implement all features of programs to specified requirements and appropriate to sequence of operation.
- C. The DDC control panel shall be mounted in the same mechanical room as the equipment being controlled, or an adjacent utility room. Exact locations shall be coordinated in the field with the owner and engineer.
- D. Where Ethernet is used for building level communication, a dedicated switch should be located in a BMS enclosure with the other DDC control panels and be configured on a private sub-network separate from the Wake County network.
- E. Multiple systems can be programmed on the same controller as long as they are in the same room. Systems on separate floors shall have separate controllers.
- F. VAV boxes subnetworks shall be connected to the AHU controller that feeds those boxes. If multiple subnetworks are needed, then the VAV shall be grouped into subnetworks in an orderly method, such as per floor, per wing, etc.
- G. Remote sensors shall be wired to the control panel of the equipment it is controlling, not across the network.
- H. Signals to remote motor control centers shall be hard wired to the control panel, not across the network.
- I. Terminal units shall each have their own controller.
- J. Connect and configure equipment and software to achieve the sequence of operation specified.
- K. Verify location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation. Locate 60 inches (1524 mm) above floor.
- L. Any required ethernet cable not already identified in the scope of the project shall be the responsibility of the contractor to coordinate and install. The contractor shall provide conduit and cable to connect to the Wake County Network. Connection point will be determined in the field with owner and engineer.
- M. Any required power wiring not already identified in the scope of the project shall be the responsibility of the vendor to coordinate and install.
- N. Install labels and nameplates to identify control components.
- O. Install white vinyl label on each sensor/actuator indicating installation date of sensors/actuators (vinyl handheld label maker).
- P. Install labels to VAV and terminal boxes on ceiling grid below device. Provide ceiling grid labels to identify sensors and devices above ceiling outside of mechanical rooms. (white vinyl handheld label maker).
- Q. Wires shall be labeled at every final and intermediate termination. Labels should identify point, panel and equipment number.

- R. Actuators with line voltage shall be fed from a circuit dedicated to actuators only for a single piece of equipment.
- S. DDC Controls Contractor shall provide all 120-volt power circuit to each DDC device requiring power. Electrical material and installation shall be in accordance with appropriate requirements with Division 26.
- T. All DDC control conduits shall be factory colored blue. Field painted conduit is not acceptable.
- U. Conduits for control wiring shall not exceed 40% fill.
- V. Graphics should be completed and active prior to the commissioning process and prior to substantial completion.
- W. Point Structuring and Naming:
  - 1. The intent of this Section is to require a consistent means of naming points across Wake County WAN. Configure the systems from the perspective of Wake County WAN, not solely the local Project. The following requirement establishes a standard for naming points and addressing Buildings, Networks, Devices, Instances, and the like. The convention is tailored towards Wake County WAN and as such, the interface shall always use this naming convention. BACnet systems shall also use this naming convention. For non-BACnet systems, the naming convention shall be implemented as much as practical, and any deviations from this naming convention shall be approved by Wake County.
  - 2. Each Network Controller shall have English language descriptors for all system points, variables, parameters etc. located and accessible from the NC memory. All point naming shall match between all system files and record documents.
  - 3. Point Summary Table: The term 'Point' is a generic description for the class of object represented by analog and binary inputs, outputs, and values. With each schematic, Network Integrator shall provide a Point Summary Table listing:
    - a. Equipment type.
    - b. Equipment number.
    - c. Equipment code.
    - d. Full point name (see Point Naming Convention paragraph).
    - e. Point description.
    - f. Object type.
    - g. Engineering units.
    - h. Network variable.
  - 4. Additional fields for non- BACnet systems shall be appended to each row. Point Summary Table shall be provided in in electronic format (ODBC-compliant).
  - 5. Point Summary Table shall also illustrate Network Variable Data Links.
  - 6. The System Integrator shall coordinate with Wake County representative to compile and submit a proposed Point Summary Table for review (see point naming submittal) prior to any object programming or Project startup. Wake County shall grant approval of final point names to be verified through Commissioning by issuing the approved alarms to the System Integrator.
  - 7. All points shall be identified per Wake County's nomenclature/naming convention provided by owner.
  - 8. System Enable Points – Each AHU, hot water system, chilled water system should indicate a system enable point to allow for taking the unit offline manually.
  - 9. Adjustable points – Temperature associated with a temperature reset, pressure reset, outdoor air lock out or other variable indicated as adjustable should be created as a point and be indicated on a graphic for adjustment.

10. All functional variables within the code such as mode, Temperature Bands, Average Temperature, Cooling Loop Outputs and other points used within the programming should be created as virtual points for the purposes of troubleshooting.
  11. Actuators should be programmed and displayed as 0% = closed and 100% = open.
  12. Comment lines should be included in the code which is active on the controller. Comments should be complete enough to determine what is included within the code without reading the programming language.
- X. Trend Point Naming. The naming convention for points shall be in plain English and separate the data using the underscore ( \_ ) and include the building number, building acronym, equipment, point and time interval or COV.

Trend Name Examples:

- 232FVL\_AHU01\_SupplyAirTemp\_15min
- 232FVL\_Vav01\_15\_SpaceTemp
- 232\_FVL\_ChilledWater\_ChillerEnable
- 232FVL\_HotWater\_Boiler02\_FireRate

1. Trends shall be as follows: Unless otherwise noted on the construction drawings, 15 minute interval trends should be set up for
  - a. All points, physical and virtual associated with AHUs
  - b. All points, physical and virtual associated with DX Systems
  - c. VAV, terminal - space temperature, humidity, temperature setpoint, valve position, discharge temp, air flow and damper position
  - d. Chiller/Boiler Plants – Chiller/Boiler enable, supply temp, return temp, secondary supply temp, secondary return temp, primary and secondary pump – enable, status, speed, and all flow readings
  - e. Chiller BACnet values – enable, supply temperature, temp set point, capacity, power, compressor status
  - f. Boiler BACnet values – enable, supply temperature, temperature set point, firing rate
  - g. Water Submeters – Total volume, year to date volume, flow rate
  - h. Natural Gas Submeter – Total Volume, year to date Volume, flow rate
  - i. Electrical Submeter – Circuit total power (kW), Circuit energy (kwh) total, Circuit energy (kWh) year to date

### 3.3 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Division 01.
- B. Start-up and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.
- C. Provide service engineer to instruct Owner's representatives in operation of systems plant and equipment, for one 8 hour period.

### 3.4 SCHEDULING OF TRAINING SHALL BE COORDINATED WITH OWNER

- A. Provide basic operator training for a minimum of 4 persons on sequence of operations data display, alarm and status descriptions, requesting data, execution of commands and request of logs. Include a minimum of (12) hour's dedicated instructor time. Provide as-built documents and O & M manuals for each person. A portion of the instruction time shall be specifically

dedicated to the building life safety systems. As built drawings on paper and cad. As built drawings shall have a link to them shown on the controls front-end.

- B. Provide follow-up field services for one (1) year after beneficial occupancy. This shall include four (4), eight (8) hour site visits; once every three (3) months for the first year. This shall be for any necessary device calibrations, system debugging, or instruction. All visits shall be scheduled with owner.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three (3) visits to Project during other than normal occupancy hours for this purpose.

### 3.5 COMMISSIONING

- A. Manufacturer's Field Services: Provide the services of a factory-authorized service representative to start control systems. Shall be scheduled with owner. Test and adjust controls and safeties.
- B. System Equipment: Upon completion of installation of each piece of equipment, field- inspect and mechanically and electrically test equipment for proper function.
- C. Field Materials: Upon completion of installation of each piece of equipment, field-inspect and mechanically and electrically test equipment for proper function.
- D. Acceptance Testing. Upon completion of the installation, the Contractor shall start up the system and perform all necessary trending, scheduling calibration, testing, and debugging operations. The Contractor in the presence of the Owners' representative shall perform an acceptance test. Acceptance test procedure to be submitted, for approval no later than 4 weeks prior to testing. Submission of test procedure shall imply that systems are complete, functional and that contractor has verified performance. Successful completion of acceptance testing shall be required prior to substantial completion.
- E. Perform the following field tests and inspections and prepare test reports:
  - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
  - 2. Test and adjust controls and safeties.
  - 3. Test calibration of controllers inputs, outputs, and sensors.
  - 4. Test each point through its full operating range to verify that safety and operating control set points are as required.
  - 5. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
  - 6. Test each system for compliance with sequence of operation.
  - 7. Test software and hardware interlocks.
- F. DDC Verification:
  - 1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
  - 2. Check instruments for proper location and accessibility.
  - 3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
  - 4. Check instrument tubing for proper fittings, slope, material, and support.
  - 5. Check installation of air supply for each instrument.

6. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
7. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
8. Check temperature instruments and material and length of sensing elements.
9. Check control valves. Verify that they are in correct direction.
10. Check air-operated dampers. Verify that pressure gages are provided and that proper blade alignment, either parallel or opposed, has been provided.
11. Check DDC system as follows:
  - a. Verify that DDC controller power supply is from emergency power supply, if applicable.
  - b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
  - c. Verify that spare I/O capacity has been provided.
  - d. Verify that DDC controllers are protected from power supply surges.
12. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.
13. Calibrating and Adjusting:
  - a. Calibrate instruments.
  - b. Make three-point calibration test for both linearity and accuracy for each analog instrument.
  - c. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
  - d. Control System Inputs and Outputs:
    - 1) Check analog inputs at 0, 50, and 100 percent of span.
    - 2) Check analog outputs using milliamperemeter at 0, 50, and 100 percent output.
    - 3) Check digital inputs using jumper wire.
    - 4) Check digital outputs using ohmmeter to test for contact making or breaking.
    - 5) Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
  - e. Flow:
    - 1) Calibrate the input sensors to the specified accuracy.
    - 2) Manually operate flow switches to verify that they make or break contact.
  - f. Pressure:
    - 1) Calibrate pressure transmitters at 0, 50, and 100 percent of span.
    - 2) Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
  - g. Temperature:
    - 1) Calibrate the input sensors to the specified accuracy.
    - 2) Calibrate temperature switches to make or break contacts.

- h. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
    - 1) Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
    - 2) Provide diagnostic and test instruments for calibration and adjustment of system.
    - 3) Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures. Document all tests and provide to Wake County.
  - i. Adjust initial temperature and humidity set points.
  - j. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three (3) visits to Project during other than normal occupancy hours for this purpose.
  - k. Carbon Dioxide: Verify CO<sub>2</sub> readings with a calibration kit or against a known accurate device.
- G. Replace damaged or malfunctioning controls and equipment.
- H. Start, test, and adjust control systems.
- I. Demonstrate compliance with requirements.
- J. Adjust, calibrate, and fine tune circuits and equipment to achieve the sequence of operation specified without fault or failure.

### 3.6 DEMONSTRATION

- A. Demonstrate a complete and fully operational system to Owner as required by contract documents near completion of project.

### 3.7 GRAPHICS

- A. See Graphic standards.
- B. Contractor shall submit graphics via a submittal and correct any deficiencies prior to project acceptance
- C. Contractor shall allow four (4) hours of additional graphic design/modify time to adjust, develop, modify, and install the graphics after the DDC controls are installed and operational. The owner will provide marked up graphics illustrating the work.

**END OF SECTION 23 0900**

## **GRAPHIC STANDARDS**

### Graphics Guidelines

- a. Graphics should be developed and submitted to the County via a project submittal.
- b. Graphics should be completed and active prior to the commissioning process.
- c. Standard units of measure should be used and labeled as follows:

<b>Value</b>	<b>Unit</b>
Temperature	°F
Water Flow	gpm
Air Flow	CFM
Relative Humidity	%RH
Water Differential Pressure	psi
Gas Volume	CCF
Gas Flow	CFH

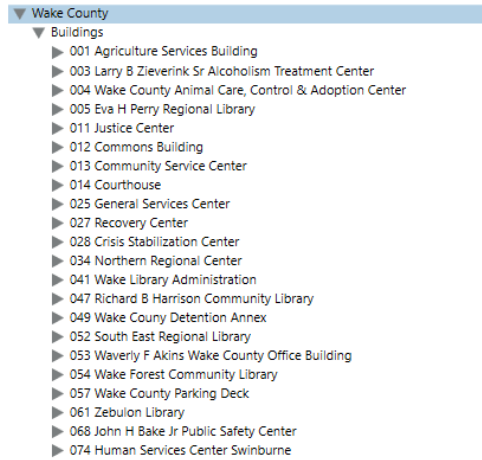
<b>Value</b>	<b>Unit</b>
Enthalpy	BTU/lb°F
Carbon Dioxide	ppm
Static Pressure	“WC
Filter Differential Pressure	“WC
Power	kW
Electrical Energy	kWh

- d. Setpoints – should be located beneath each point controlled to a set point
- e. System Enable Points – Each AHU, hot water system, chilled water system should indicate a system enable point to allow for taking the unit offline manually.
- f. Adjustable points – Temperature associated with a temperature reset, pressure reset, outdoor air lock out or other variable indicated as adjustable should be created as a point and be indicated on a graphic for adjustment.
- g. Actuators/Damper/Valves should be programmed and displayed as 0% = closed and 100% = open.

### Graphics Examples

To the extent technically possible all graphics shall be based upon the examples shown below. All features of the graphics, such as title block, navigation buttons, etc., shall always be located in the same general area on each Graphic.

- a. Navigation – Buildings should be organized in a navigation tree and include the three-digit building identification number.



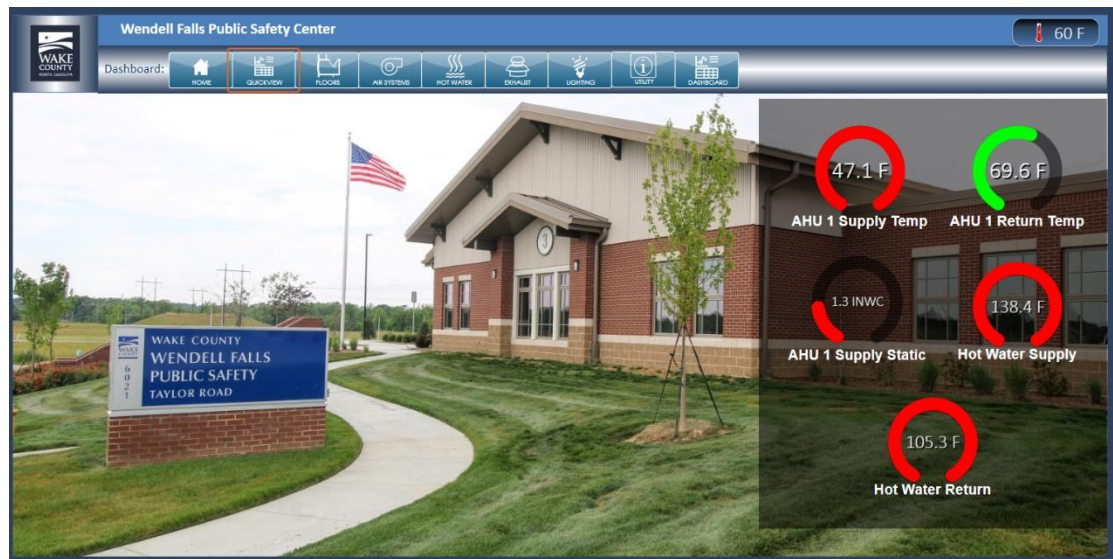
4 Figure 1: Navigation Tree

Navigation – A top navigation bar should include site-specific graphics for the main mechanical and control systems, and the outdoor conditions for that site.



5 Figure 2: Navigation Bar

Site Home Page – A site-specific home page should be created to provide an overview of the main systems status. The home page should include the navigation bar, building photo, and readings for the main systems such as AHU supply temperatures, hot water and chiller water supply temperatures and average building temperature



6 Figure 3: Home Page

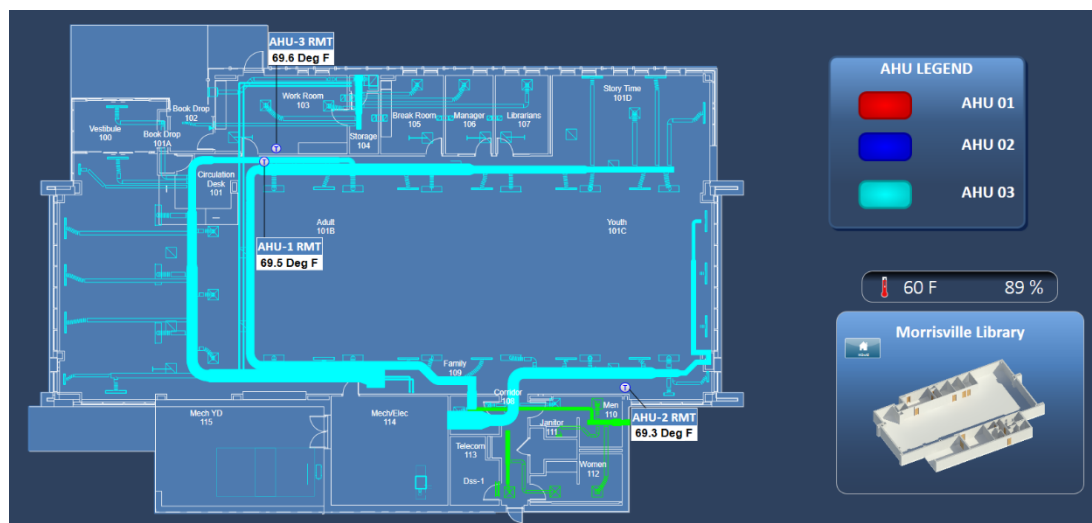


AHU Graphics – Air handling unit graphics should represent the ductwork and airflow as accurately as possible. Where multiple ducts or paths are present, the graphics should represent this. Sensor locations should be accurately represented.



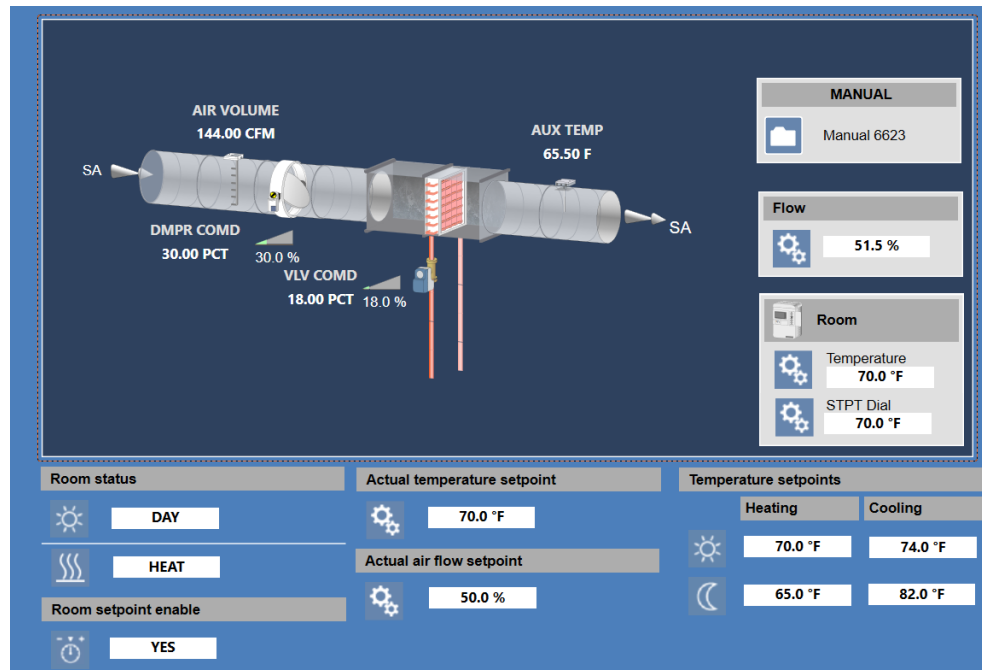
7 Figure 4: AHU Graphic

Floor Navigation – A floor plan should be created from the architectural floor plans and include duct work with one color per AHU. A legend should indicate AHU number and color. VAV boxes should be indicated and the zone ductwork and zone should be identifiable. Main equipment should be indicated and labeled. Ductwork should be a layer that can be toggled on/off.



8 Figure 5: Floor Navigation - Example 1





12 Figure 9: VAV Graphic

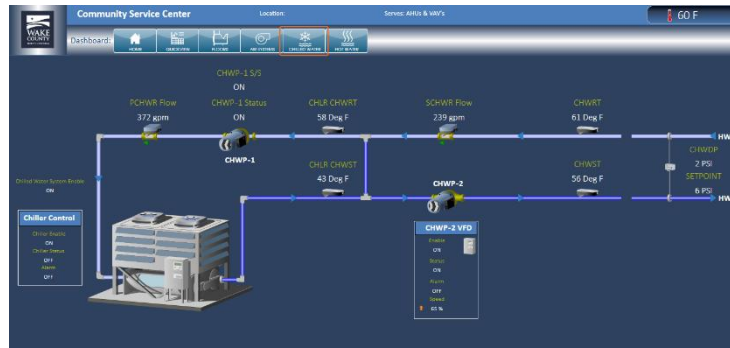
VFD Graphics – A separate graphic should be created for each VFD in addition to the information presented as part of the AHU or system. The separate graphic should show BACnet values to the extent possible.

VFD Graphic within in other pages: The VFD on the equipment (AHU/Hot Water Plant/etc) page should show enable, status, alarm, command speed and power.

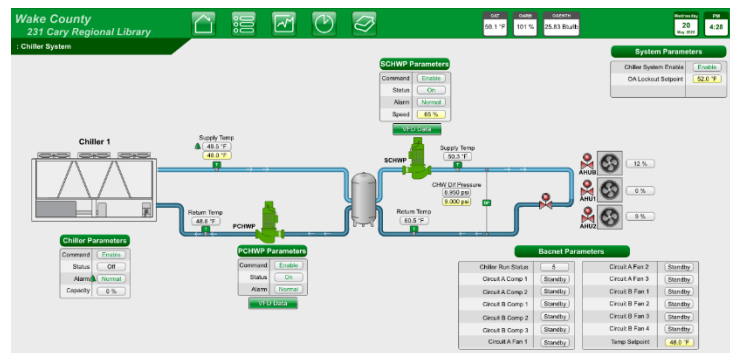


13 Figure 10: VFD points in Equipment Graphic

Chiller and Boilers plants should be indicated with all system points including system enable, alarm, chiller/boiler enable, chiller/boiler status, lockout temperature setpoints, reset schedules, etc. Temperature resets based on outside air should be indicated in a table. Relevant BACnet points for the chiller/boiler should be included such as firing rate, current capacity/compressor status. Note that the flow diagram may not fit on a single Graphic for large or complex Central Plants. If this happens, the condenser water system and the chilled water system shall be broken out into separate Graphics.



14 Figure 11: Plant Graphic - Example 1



15 Figure 12: Plant Graphic - Example 2

OATmp	SupTmp
20	180
70	100

°F

16 Figure 13: Temperature Reset Table in Plant Graphic - Example

Power meters – Pertinent values for each power meter should be displayed in a table. The table should display at minimum phase voltage, total power, and total energy for each channel measured. Where multiple circuits are metered within a building, one-line riser or tree shall display the kW and kWh of each circuit with descriptions of each circuit displayed.

Panel "MDP" Points Room 121		Panel "R2" Points Room 121		Panel "M" Points Room 120		Panel "R1" Points Room 120		Panel "L1" Points Room 120	
Current A	26.63	Current A	0.24	Current A	3.68	Current A	0.00	Current A	22.19
Current B	30.26	Current B	0.06	Current B	1.54	Current B	0.00	Current B	24.71
Current C	9.50	Current C	0.36	Current C	2.51	Current C	0.00	Current C	0.90
Voltage A	216.75	Voltage A	216.93	Voltage A	216.81	Voltage A	0.00	Voltage A	216.26
Voltage B	216.32	Voltage B	216.44	Voltage B	216.26	Voltage B	0.00	Voltage B	216.32
Voltage C	216.20	Voltage C	216.38	Voltage C	216.26	Voltage C	0.00	Voltage C	216.08
Voltage L-NV	124.95	Voltage L-NV	125.02	Voltage L-NV	125.00	Voltage L-NV	0.00	Voltage L-NV	124.81
Real Power	8.28	Real Power	0.04	Real Power	0.64	Real Power	0.00	Real Power	5.95
Energy Dlv	219,591.36	Energy Dlv	1,485.39	Energy Dlv	57,937.13	Energy Dlv	13,830.75	Energy Dlv	82,809.61
Frequency	60.00	Frequency	60.00	Frequency	60.00	Frequency	0.00	Frequency	60.00

Figure 14: Power Meter Graphic Example

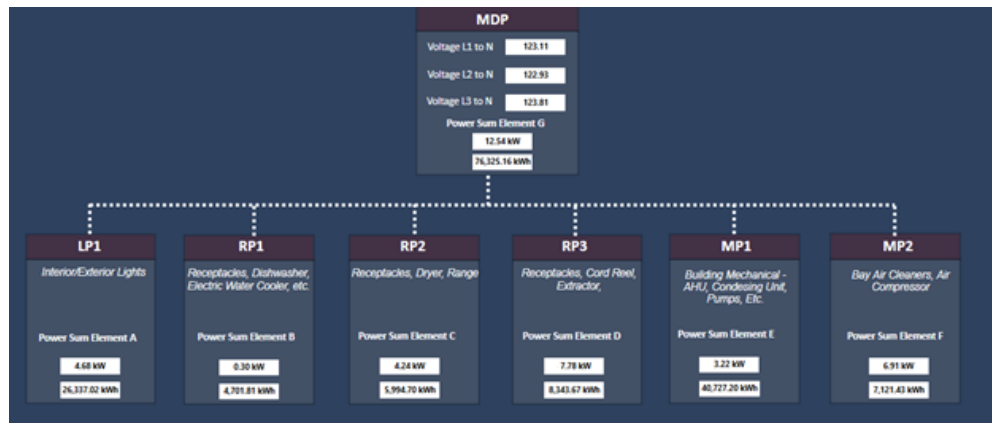


Figure 15: Power Meter - Riser/Tree Example

## Wake County GSA BMS Naming Convention

All physical and virtual points as well as equipment should follow the point naming convention. Both name and description should be completed to allow for quick identification of point, location and purpose. Where possible, points should be case sensitive to follow the naming convention.

### Single Equipment Points

#### Example:

**BACnet Name: 149ERL.01.AHU01.SAFanEnbl**

**BACnet Description: 149ERL – AHU01 Supply Fan Enable**

Where: 149 = Building Number;

ERL = Building Acronym;

01 = Floor Number

AHU = Equipment Type; See Table

01 = Equipment Number

SAFan = Component;

Enbl = Measurement/Control

### Terminal Box / VAV Points

#### Examples:

**BACnet Name: 149ERL.02.AHU02.TBP15.FanEnbl**

**BACnet Description: 149ERL – Terminal Box 15 – Fan Enable**

Where: 149 = Building Number; see key

ERL = Building Acronym; see key

02 = Floor Number

AHU02 = Air Handler Number

TBP = Terminal Box: Parallel

15 = Terminal Box Number

FanEnbl = Measurement/Control (TEC fan control)

**BACnet Name: 149ERL.03.AHU01.VAV08.DmprCtl**

**BACnet Description: 149ERL – VAV08 – Damper Control**

Where: 149 = Building Number; see key

ERL = Building Acronym; see key

03 = Floor Number

AHU01 = Air Handler Number

VAV = VAV Box

08 = VAV Box Number

DmprCtl = Measurement/Control (TEC Damper control)

**Building floor level designations for BMS points:**

PD	Pod
DM	Dorm
0B	Basement
0G	Ground
0M	Main
1	First
MZ	Mezzanine
2	Second
3	Third
4	Fourth

5	Fifth
6	Sixth
7	Seventh
8	Eighth
9	Ninth
10	Tenth
11	Eleventh and so on

**Equipment Type**

Equipment Type	Equipment Description
AHU	Air Handling Unit
Blr	Boiler
Dmpr	Control Damper
CU	Condensing Unit
Chem	Chemical Feeder
Chlr	Chiller
CT	Cooling Tower
DctHtr	Duct Heater, Electric
FireDoor	Fire Door
Gen	Emergency Generator
Evap	Evaporator Coil
DX	Direct Expansion Cooling Circuit
ExFan	Exhaust Fan
EXH	Exhaust Hood
ExtLgt	Exterior Lighting
IntLgt	Interior Lighting
FACP	Fire Alarm Panel
FCU	Fan Coil Unit
FDmpr	Fire Damper
HP	Heat Pump
HX	Heat Exchanger
HVAC	Heating Vent. /Ac System
SumpLvl	Sump Level Sensor
Pmp	Pump
StairFan	Stair Pressurization Fan
PRV	Pressure Reducing Valve
RAFan	Return Air Fan
RTU	Roof Top Unit
SAFan	Supply Air Fan
SmkDmpr	Smoke Damper
SumpPmp	Sump Pump
FPBP	Fan Powered Box / Terminal Box (Parallel)
FPBS	Fan Powered Box / Terminal Box (Series)
Tnk	Tank
ATS	Automatic Transfer Switch
UH	Unit Heater
UPS	Uninterruptable Power Supply
VAV	Vav Box
VFD	Variable Frequency Drive
PTAC	Wall A/C
WH	Water Heater
Smk	Smoke Detector

**Component**

Component Name	Component Description
Econ	Economizer
C02	Carbon Dioxide
CdW	Condenser Water
Chlr	Chiller
ChW	Chilled Water
ChWS	Chilled Water System
Coil	Coil
SA	Supply Air
RA	Return Air
MA	Mixed Air
EA	Exhaust Air
OA	Outside Air
Pht	Preheat
S	Supply (Water)
R	Return (Water)
DX	DX Cooling Stage
CT	Cooling Tower
CoolCoil	Cooling Coil
EOL	End of Line
FrzStat	Freezestat
Flm	Flame
Fltr	Filter
Gas	Natural Gas
Elec	Electric
Heat	Heating
Vib	Vibration
IsoVlv	Isolation Valve
MkUp	Make Up (Water)
HeatCoil	Heating Coil
Hum	Humidity
HW	Hot Water
HWS	Hot Water System
Rht	Reheat
Rm	Room
Spc	Space
Stm	Steam
Smk	Smoke
LPStm	Low Pressure Steam

**Sub Component**

Component Name	Component Description
Vlv	Valve
Byp	Bypass
Pmp	Pump
Dmpr	Damper
Dmd	Demand
Fan	Fan
Dehum	Dehumidification Equipment/Sequence
EndSwitch	End Switch
Lo	Low
Hi	High
Pre	Pre (before)
Pwr	Power

**Measurement / Control**

Measurement/Control	Measurement/Control Description
Cap	Capacity
Tmp	Temperature
SP	Setpoint
TmpSP	Temperature Setpoint
STmp	Supply Temp
RTmp	Return Temp
STmpSP	Supply Temp Setpoint
Enbl	Enable
Stat	Status
Alm	Alarm
Amp	Amps
Flow	Air/Water Flow
RFlow	Return Flow
SFlow	Supply Flow
PosFdBck	Position Feedback
Ctl	Control Signal
OnSP	On Setpoint
Req	System Request/Enable (AHU/Chilled Water System/Hot Water System)
DP	Differential Pressure
Enth	Enthalpy
FireRate	Boiler Flame Control
DewPt	Dew Point
Prs	Pressure
Spd	Speed - Control
SpdFdBck	Speed - Feedback from VFD
Hi	High Speed
Lo	Low Speed
StaticPrs	Static Pressure
StaticPrsSP	Static Pressure Set point
kW	Kilowatts
kWh	Kilowatt Hours

**Combined Examples**

ChWVlv	Chiller Water Valve
ChWRFlow	Chiller Water Return Flow
ChWRTmp	Chilled Water Return Temp
ChWSPump	Chiller Water Supply Pump
ChWSTmp	Chilled Water Supply Temp
ChWSTmpSP	Chiller Water Supply Temp Setpoint
CTBypVlv	Cooling Tower Bypass Valve
CoolCoilTmp	Cooling Coil Temperature
DmprCtl	Damper Control
DmprPosFdBck	Damper Position Feedback
EconDmpr	Economizer Damper
EOLPrs	End of Line Pressure
FltrStat	Filter DP (Clean/Dirty) Status
FltrDP	Filter DP (Measurement)
GasFlow	Natural Gas Flow Rate
CTVibAlm	Cooling Tower Vibration Alarm
PreFltrDP	Pre Filter Differential Pressure
MkUpVlv	Make Up Water Valve
HiLvAlm	High Level Alarm
SAHiTmpAlm	Supply Air High Temperature Alarm
LPStmVlv	Low Pressure Steam Valve
HiStatPrsAlm	High Static Pressure Alarm
OATmp	Outside Air Temp



**Equipment Points - Examples**

Point	Building Number	Building Acronym	Floor	BACnet Name	BACnet Description
Chilled Water System - System Request/Enable/OnOff	076	ORL	1	076ORL.01.ChWS.SysReq	076ORL - Chilled Water System Request
Chilled Water System - Demand (tons)	076	ORL	1	076ORL.01.ChWS.SysDemand	076ORL - Chilled Water System Demand (tons)
Chilled Water System - Available Running Chiller Capacity	076	ORL	1	076ORL.01.ChWS.SysCap	076ORL - Chilled Water System Capacity (tons)
Chilled Water System - Chilled Water Pump 1 - Enable/OnOff	076	ORL	1	076ORL.01.ChWS.ChWPmp1Enbl	076ORL - Chilled Water Pump 1 - Enable
Chilled Water System - Chilled Water Pump 1 - Status	076	ORL	1	076ORL.01.ChWS.ChWPmp1Stat	076ORL - Chilled Water Pump 1 - Status
Chilled Water System - Chilled Water Pump 1 - Speed	076	ORL	1	076ORL.01.ChWS.ChWPmp1Spd	076ORL - Chilled Water Pump 1 - Speed
Chilled Water System - Chilled Water Pump 1 - Alarm	076	ORL	1	076ORL.01.ChWS.ChWPmp1Alm	076ORL - Chilled Water Pump 1 - Alarm
Chilled Water System - Chilled Water Pump 1 - Flow Meter on Pump	076	ORL	1	076ORL.01.ChWS.ChWPmp1Flow	076ORL - Chilled Water Pump 1 - Flow Meter on Pump
Chilled Water System - Secondary Chilled Water Pump 2 - Enable/OnOff *Others named in similar manor	076	ORL	1	076ORL.01.ChWS.ChWPmp2Enbl	076ORL - Secondary Chilled Water Pump 2 - Enable
Chilled Water System - Secondary Loop Differential Pressure	076	ORL	1	076ORL.01.ChWS.SecDP	076ORL - Chilled Water Secondary Loop Differential Pressure
Chilled Water System - Secondary Loop Differential Pressure - Setpoint	076	ORL	1	076ORL.01.ChWS.SecDPSP	076ORL - Chilled Water Secondary Loop Differential Pressure - Setpoint
Chilled Water System - Secondary Loop Supply Temperature	076	ORL	1	076ORL.01.ChWS.SecSTmp	076ORL - Chilled Water Secondary Loop Supply Temperature
Chilled Water System - Secondary Loop Return Temperature	076	ORL	1	076ORL.01.ChWS.SecRTmp	076ORL - Chilled Water Secondary Loop Return Temperature
Chilled Water System - Chiller 1 - Enable/Request	076	ORL	1	076ORL.01.ChWS.Chlr1Enbl	076ORL - Chiller 1 - Enable
Chilled Water System - Chiller 1 - Status	076	ORL	1	076ORL.01.ChWS.Chlr1Stat	076ORL - Chiller 1 - Status
Chilled Water System - Chiller 1 - Isolation Valve - Command	076	ORL	1	076ORL.01.ChWS.Chlr1IsoVlv	076ORL - Chiller 1 - Isolation Valve - Command
Chilled Water System - Chiller 1 - Isolation Valve - Status	076	ORL	1	076ORL.01.ChWS.Chlr1IsoVlvStat	076ORL - Chiller 1 - Isolation Valve - Status
Chilled Water System - Chiller 1 - Alarm	076	ORL	1	076ORL.01.ChWS.Chlr1Alm	076ORL - Chiller 1 - Alarm
Chilled Water System - Chiller 1 - Condenser Water Flow	076	ORL	1	076ORL.01.ChWS.Chlr1CondFlow	076ORL - Chiller 1 - Condenser Water Flow
Chilled Water System - Chiller 1 - Chilled Water Supply Temperature	076	ORL	1	076ORL.01.ChWS.Chlr1ChWSTmp	076ORL - Chiller 1 - Chilled Water Supply Temperature
Chilled Water System - Chiller 1 - Chilled Water Supply Temp Setpoint	076	ORL	1	076ORL.01.ChWS.Chlr1ChWSTmpSP	076ORL - Water Water
Chilled Water System - Chiller 1 - Chilled Water Return Temperature	076	ORL	1	076ORL.01.ChWS.Chlr1ChWRTmp	076ORL - Chiller 1 - Chilled Water Return Temperature
Chilled Water System - Chiller 1 - Condenser Water Supply Temperature	076	ORL	1	076ORL.01.ChWS.Chlr1CdWSTmp	076ORL - Chiller 1 - Condenser Water Supply Temperature
Chilled Water System - Chiller 1 - Condenser Water Return Temperature	076	ORL	1	076ORL.01.ChWS.Chlr1CdWRTmp	076ORL - Chiller 1 - Condenser Water Return Temperature
Chilled Water System - Chiller 1 - Amps	076	ORL	1	076ORL.01.ChWS.Chlr1Amp	076ORL - Chiller 1 - Amps
Chilled Water System - Chiller 1 - Capacity	076	ORL	1	076ORL.01.ChWS.Chlr1Cap	076ORL - Chiller 1 - Capacity
Chilled Water System - Condenser Water System Return Temperature (to Cooling Towers)	076	ORL	1	076ORL.01.ChWS.CdWRTmp	076ORL - System Condenser Water Return Temperature
Chilled Water System - Condenser Water System Supply Temperature (from Cooling Tower)	076	ORL	1	076ORL.01.ChWS.CdWSTmp	076ORL - System Condenser Water Supply Temperature
Chilled Water System - Condenser Water Pump 1 - Enable/On-Off	076	ORL	1	076ORL.01.ChWS.CdWPmp1Enbl	076ORL - Condenser Water Pump 1 - Enable
Chilled Water System - Condenser Water Pump 1 - Status	076	ORL	1	076ORL.01.ChWS.CdWPmp1Stat	076ORL - Condenser Water Pump 1 - Status
Chilled Water System - Condenser Water Pump 1 - Alarm	076	ORL	1	076ORL.01.ChWS.CdWPmp1Alm	076ORL - Condenser Water Pump 1 - Alarm
Chilled Water System - Cooling Tower 1 - Enable	076	ORL	1	076ORL.01.ChWS.CTwr1Enbl	076ORL - Cooling Tower 1 - Enable
Chilled Water System - Cooling Tower 1 - Status	076	ORL	1	076ORL.01.ChWS.CTwr1Stat	076ORL - Cooling Tower 1 - Status
Chilled Water System - Cooling Tower 1 - Alarm	076	ORL	1	076ORL.01.ChWS.CTwr1Alm	076ORL - Cooling Tower 1 - Alarm
Chilled Water System - Cooling Tower 1 - Isolation Valve Command	076	ORL	1	076ORL.01.ChWS.CTwr1IsoVlv	076ORL - Cooling Tower 1 - Isolation Valve Command
Chilled Water System - Cooling Tower 1 - Isolation Valve Status	076	ORL	1	076ORL.01.ChWS.CTwr1IsoVlvStat	076ORL - Cooling Tower 1 - Isolation Valve Status
Chilled Water System - Cooling Tower 1 - Fan Enable (Low Speed)	076	ORL	1	076ORL.01.ChWS.CTwr1FanLo	076ORL - Cooling Tower 1 - Fan Enable Low Speed
Chilled Water System - Cooling Tower 1 - Fan Enable (High Speed)	076	ORL	1	076ORL.01.ChWS.CTwr1FanHi	076ORL - Cooling Tower 1 - Fan Enable High Speed
Chilled Water System - Cooling Tower 1 - Fan Enable	076	ORL	1	076ORL.01.ChWS.CTwr1FanEnbl	076ORL - Cooling Tower 1 - Fan Enable
Chilled Water System - Cooling Tower 1 - Fan Speed	076	ORL	1	076ORL.01.ChWS.CTwr1FanSpd	076ORL - Cooling Tower 1 - Fan Speed
Chilled Water System - Cooling Tower 1 - Fan Speed Feedback	076	ORL	1	076ORL.01.ChWS.CTwr1FanSpdFdBck	076ORL - Cooling Tower 1 - Fan Speed Feedback
Chilled Water System - Cooling Tower 1 - Condenser Water Return Temperature (in to Tower)	076	ORL	1	076ORL.01.ChWS.CTwr1CdWRTmp	076ORL - Cooling Tower 1 - Condenser Water Return Temperature
Chilled Water System - Cooling Tower 1 - Sump Temperature (in Tower)	076	ORL	1	076ORL.01.ChWS.CTwr1SumpTmp	076ORL - Cooling Tower 1 - Sump Temperature
Chilled Water System - Cooling Tower 1 - Condenser Water Supply Temperature (from Tower)	076	ORL	1	076ORL.01.ChWS.CTwr1CdWSTmp	076ORL - Cooling Tower 1 - Condenser Water Supply Temperature
Chilled Water System - Cooling Tower 1 - Bypass Valve Command	076	ORL	1	076ORL.01.ChWS.CTwr1BypassVlv	076ORL - Cooling Tower 1 - Bypass Valve Command
Chilled Water System - Cooling Tower 1 - Tower Valve Command	076	ORL	1	076ORL.01.ChWS.CTwr1TwrVlv	076ORL - Cooling Tower 1 - Tower Valve Command
Chilled Water System - Cooling Tower 1 - Vibration Alarm	076	ORL	1	076ORL.01.ChWS.CTwr1VibAlm	076ORL - Cooling Tower 1 - Vibration Alarm
Chilled Water System - Cooling Tower 1 - Low Level Alarm	076	ORL	1	076ORL.01.ChWS.CTwr1LoLvlAlm	076ORL - Cooling Tower 1 - Low Level Alarm
Chilled Water System - Cooling Tower 1 - High Level Alarm	076	ORL	1	076ORL.01.ChWS.CTwr1HiLvlAlm	076ORL - Cooling Tower 1 - High Level Alarm
Chilled Water System - Cooling Tower 1 - Make Up Water Valve	076	ORL	1	076ORL.01.ChWS.CTwr1MkUpVlv	076ORL - Cooling Tower 1 - Make up Water Valve
Chilled Water System - Cooling Tower 1 - Make Up Water Sensor	076	ORL	1	076ORL.01.ChWS.CTwr1MkUpReq	076ORL - Cooling Tower 1 - Make up Water Sensor
Hot Water System - Enable/OnOff	076	ORL	1	076ORL.01.HWS.SysReq	076ORL - Hot Water System - Enable
Hot Water System System - Boiler 1 - Enable	076	ORL	1	076ORL.01.HWS.Blr1Enbl	076ORL - Boiler 1 - Enable
Hot Water System System - Boiler 1 - Status	076	ORL	1	076ORL.01.HWS.Blr1Stat	076ORL - Boiler 1 - Status
Hot Water System System - Boiler 1 - Isolation Valve Command	076	ORL	1	076ORL.01.HWS.Blr1IsoVlv	076ORL - Boiler 1 - Isolation Valve Command
Hot Water System System - Boiler 1 - Isolation Valve Status	076	ORL	1	076ORL.01.HWS.Blr1IsoVlvStat	076ORL - Boiler 1 - Isolation Valve Status
Hot Water System System - Boiler 1 - Gas Input Flow	076	ORL	1	076ORL.01.HWS.Blr1GasFlow	076ORL - Boiler 1 - Gas Input Flow
Hot Water System System - Boiler 1 - Hot Water Supply Temperature	076	ORL	1	076ORL.01.HWS.Blr1STmp	076ORL - Boiler 1 - Hot Water Supply Temperature

**WAKE COUNTY OFFICE BUILDING**  
**12<sup>th</sup> + 14<sup>th</sup> Floors Fit Up**

**Huffman Architects, PA**

Hot Water System System - Boiler 1 - Hot Water Return Temperature	076	ORL	1	076ORL.01.HWS.Blr1RTmp	076ORL - Boiler 1 - Hot Water Return Temperature
Hot Water System System - Boiler 1 - Hot Water Supply Flow	076	ORL	1	076ORL.01.HWS.Blr1Flow	076ORL - Boiler 1 - Hot Water Supply Flow
Hot Water System System - Boiler 1 - Firing Rate	076	ORL	1	076ORL.01.HWS.Blr1FireRate	076ORL - Boiler 1 - Firing Rate
Hot Water System System - Boiler 1 - Boiler Pump 1 (BP1) Enable	076	ORL	1	076ORL.01.HWS.Blr1BlrPmp1Enbl	076ORL - Boiler 1 - Boiler Pump 1 Enable
Hot Water System System - Boiler 1 - Boiler Pump 1 (BP1) Status	076	ORL	1	076ORL.01.HWS.Blr1BlrPmp1Stat	076ORL - Boiler 1 - Boiler Pump 1 Status
Hot Water System - Hot Water Pump 1 - Enable/OnOff	076	ORL	1	076ORL.01.HWS.HWPmp1Enbl	076ORL - Hot Water Pump 1 - Enable
Hot Water System - Hot Water Pump 1 - Status	076	ORL	1	076ORL.01.HWS.HWPmp1Stat	076ORL - Hot Water Pump 1 - Status
Hot Water System - Hot Water Pump 1 - Speed Command	076	ORL	1	076ORL.01.HWS.HWPmp1Spd	076ORL - Hot Water Pump 1 - Speed Command
Hot Water System - Hot Water Pump 1 - Alarm	076	ORL	1	076ORL.01.HWS.HWPmp1Alm	076ORL - Hot Water Pump 1 - Alarm
Hot Water System - Hot Water Pump 1 - Flow	076	ORL	1	076ORL.01.HWS.HWPmp1Flow	076ORL - Hot Water Pump 1 - Flow
Hot Water System - Secondary Differential Pressure	076	ORL	1	076ORL.01.HWS.SecDP	076ORL - Hot Water System - Secondary Differential Pressure
Hot Water System - Secondary Differential Pressure - Setpoint	076	ORL	1	076ORL.01.HWS.SecDPSP	076ORL - Hot Water System - Secondary Differential Pressure - Setpoint
Hot Water System - Secondary Supply Temperature	076	ORL	1	076ORL.01.HWS.SecSTmp	076ORL - Hot System - Secondary Supply Temperature
Hot Water System - Secondary Supply Temperature Setpoint	076	ORL	1	076ORL.01.HWS.SecSTmpSP	076ORL - Hot Water System - Secondary Supply Temperature Setpoint
Hot Water System - Secondary Return Temperature	076	ORL	1	076ORL.01.HWS.SecRTmp	076ORL - Hot Water System - Secondary Return Temperature
Air Handling Unit 1 - System Enable	076	ORL	1	076ORL.01.AHU01.SysReq	076ORL - AHU01 - System Enable
Air Handling Unit 1 - Outside Air Temp	076	ORL	1	076ORL.01.AHU01.OATmp	076ORL - AHU01 - Outside Air Temp
Air Handling Unit 1 - Outside Air Humidity	076	ORL	1	076ORL.01.AHU01.OAHum	076ORL - AHU01 - Outside Air Humidity
Air Handling Unit 1 - Outside Air Dew Point	076	ORL	1	076ORL.01.AHU01.OADewP	076ORL - AHU01 - Outside Air Dew Point
Air Handling Unit 1 - Supply Air Temperature	076	ORL	1	076ORL.01.AHU01.SATmp	076ORL - AHU01 - Supply Air Temperature
Air Handling Unit 1 - Supply Air Temperature Setpoint	076	ORL	1	076ORL.01.AHU01.SATmpSP	076ORL - AHU01 - Supply Air Temperature Setpoint
Air Handling Unit 1 - Return Air Temperature	076	ORL	1	076ORL.01.AHU01.RATmp	076ORL - AHU01 - Return Air Temperature
Air Handling Unit 1 - Return Air Carbon Dioxide	076	ORL	1	076ORL.01.AHU01.RACO2	076ORL - AHU01 - Return Air Carbon Dioxide
Air Handling Unit 1 - Return Air Humidity	076	ORL	1	076ORL.01.AHU01.RAHum	076ORL - AHU01 - Return Air Humidity
Air Handling Unit 1 - Dehumidification Enable Setpoint	076	ORL	1	076ORL.01.AHU01.RADehumOnSP	076ORL - AHU01 - Dehumidification Enable Setpoint
Air Handling Unit 1 - Dehumidification Disable Setpoint	076	ORL	1	076ORL.01.AHU01.RADehumOffSP	076ORL - AHU01 - Dehumidification Disable Setpoint
Air Handling Unit 1 - Return Air Enthalpy	076	ORL	1	076ORL.01.AHU01.RAEnth	076ORL - AHU01 - Return Air Enthalpy
Air Handling Unit 1 - Mixed Air Temperature (before preheat coil)	076	ORL	1	076ORL.01.AHU01.MATmp	076ORL - AHU01 - Mixed Air Temperature
Air Handling Unit 1 - Mixed Air Temperature Setpoint (before preheat coil)	076	ORL	1	076ORL.01.AHU01.MATmpSP	076ORL - AHU01 - Mixed Air Temperature Setpoint
Air Handling Unit 1 - PreHeat Air Temperature (after preheat coil)	076	ORL	1	076ORL.01.AHU01.PreHeatTmp	076ORL - AHU01 - Preheat Temp
Air Handling Unit 1 - PreHeat Air Temperature Setpoint (after preheat coil)	076	ORL	1	076ORL.01.AHU01.PreHeatTmpSP	076ORL - AHU01 - Preheat Temp Setpoint
Air Handling Unit 1 - Supply Air Static Pressure	076	ORL	1	076ORL.01.AHU01.SAStaticPrs	076ORL - AHU01 - Supply Air Static Pressure
Air Handling Unit 1 - Supply Air Static Pressure Setpoint	076	ORL	1	076ORL.01.AHU01.SAStaticPrsSP	076ORL - AHU01 - Supply Air Static Pressure Setpoint
Air Handling Unit 1 - Supply Air High Static Pressure	076	ORL	1	076ORL.01.AHU01.SAHiStatPrs	076ORL - AHU01 - Supply Air High Static Pressure
Air Handling Unit 1 - Chilled Water Coil Supply Temperature	076	ORL	1	076ORL.01.AHU01.ChWSTmp	076ORL - AHU01 - Chilled Water Coil Supply Temperature
Air Handling Unit 1 - Chilled Water Coil Return Temperature	076	ORL	1	076ORL.01.AHU01.ChWRTmp	076ORL - AHU01 - Chilled Water Coil Return Temperature
Air Handling Unit 1 - Chilled Water Valve Position Command	076	ORL	1	076ORL.01.AHU01.ChWVlv	076ORL - AHU01 - Chilled Water Valve Position Command
Air Handling Unit 1 - Chilled Water Valve Position Feedback	076	ORL	1	076ORL.01.AHU01.ChWVlvFdBck	076ORL - AHU01 - Chilled Water Valve Position Feedback
Air Handling Unit 1 - DX Cooling Stage 1	076	ORL	1	076ORL.01.AHU01.DX1Enbl	076ORL - AHU01 - DX Cooling Stage 1
Air Handling Unit 1 - DX Cooling Stage 2	076	ORL	1	076ORL.01.AHU01.DX2Enbl	076ORL - AHU01 - DX Cooling Stage 2
Air Handling Unit 1 - Hot Water Coil Supply Temperature	076	ORL	1	076ORL.01.AHU01.HWSTmp	076ORL - AHU01 - Hot Water Coil Supply Temperature
Air Handling Unit 1 - Hot Water Coil Return Temperature	076	ORL	1	076ORL.01.AHU01.HWRTmp	076ORL - AHU01 - Hot Water Coil Return Temperature
Air Handling Unit 1 - Hot Water Valve Position Command	076	ORL	1	076ORL.01.AHU01.HWVlv	076ORL - AHU01 - Hot Water Valve Position Command
Air Handling Unit 1 - Hot Water Valve Position Feedback	076	ORL	1	076ORL.01.AHU01.HWVlvFdBck	076ORL - AHU01 - Hot Water Valve Position Feedback
Air Handling Unit 1 - Economizer Enable	076	ORL	1	076ORL.01.AHU01.EconEnbl	076ORL - AHU01 - Economizer Enable
Air Handling Unit 1 - Return Air Damper - Position Command	076	ORL	1	076ORL.01.AHU01.RADmpr	076ORL - AHU01 - Return Air Damper - Position Command
Air Handling Unit 1 - Outside Air Damper - Position Command	076	ORL	1	076ORL.01.AHU01.OADmpr	076ORL - AHU01 - Outside Air Damper - Position Command
Air Handling Unit 1 - Economizer Damper	076	ORL	1	076ORL.01.AHU01.EconDmpr	076ORL - AHU01 - Economizer Damper
Air Handling Unit 1 - Relief Air Damper - Position Command	076	ORL	1	076ORL.01.AHU01.RlfDmpr	076ORL - AHU01 - Relief Air Damper - Position Command
Air Handling Unit 1 - Supply Air Flow	076	ORL	1	076ORL.01.AHU01.SAFFlow	076ORL - AHU01 - Supply Air Flow
Air Handling Unit 1 - Return Air Flow	076	ORL	1	076ORL.01.AHU01.RAFFlow	076ORL - AHU01 - Return Air Flow
Air Handling Unit 1 - Outside Air Flow	076	ORL	1	076ORL.01.AHU01.OAFlow	076ORL - AHU01 - Outside Air Flow
Air Handling Unit 1 - Exhaust (Relief) Air Flow	076	ORL	1	076ORL.01.AHU01.RlfFlow	076ORL - AHU01 - Exhaust (Relief) Air Flow
Air Handling Unit 1 - Supply Air High Temperature Alarm	076	ORL	1	076ORL.01.AHU01.SAHITmpAlm	076ORL - AHU01 - Supply Air High Temperature Alarm
Air Handling Unit 1 - Supply Fan Start/Stop (Enable)	076	ORL	1	076ORL.01.AHU01.SAFanEnbl	076ORL - AHU01 - Supply Fan Enable
Air Handling Unit 1 - Supply Fan Status	076	ORL	1	076ORL.01.AHU01.SAFanStat	076ORL - AHU01 - Supply Fan Status
Air Handling Unit 1 - Supply Fan Speed Command	076	ORL	1	076ORL.01.AHU01.SAFanSpd	076ORL - AHU01 - Supply Fan Speed Command
Air Handling Unit 1 - Supply Fan Fault/Alarm	076	ORL	1	076ORL.01.AHU01.SAFanAlm	076ORL - AHU01 - Supply Fan Fault/Alarm
Air Handling Unit 1 - Supply Fan Power	076	ORL	1	076ORL.01.AHU01.SAFanPwr	076ORL - AHU01 - Supply Fan Power kW
Air Handling Unit 1 - Return Fan Start/Stop (Enable) *Other Points Similar to Supply Fan	076	ORL	1	076ORL.01.AHU01.RAFanEnbl	076ORL - AHU01 - Return Fan Enable
Air Handling Unit 1 - Freezestat	076	ORL	1	076ORL.01.AHU01.FrzStat	076ORL - AHU01 - Freezestat
Air Handling Unit 1 - Room Temperature	076	ORL	1	076ORL.01.AHU01.RmTmp	076ORL - AHU01 - Room Temperature
Air Handling Unit 1 - Room Humidity	076	ORL	1	076ORL.01.AHU01.RmHum	076ORL - AHU01 - Room Humidity
Exhaust Fan 1 - Enable/Start	076	ORL	1	076ORL.01.EXF01.Enbl	076ORL - Exhaust Fan 1 - Enable/Start
Exhaust Fan 1 - Status	076	ORL	1	076ORL.01.EXF01.Stat	076ORL - Exhaust Fan 1 - Status
VAV #03 - Fed from AHU01 - Damper Position Feedback	076	ORL	1	076ORL.01.AHU01.VAV03.DmprPosFdBck	076ORL - VAV03 - Damper Position Feedback
VAV #03 - Fed from AHU01 - Damper Control	076	ORL	1	076ORL.01.AHU01.VAV03.DmprCtl	076ORL - VAV03 - Damper Control Signal
VAV #03 - Fed from AHU01 - Valve Control	076	ORL	1	076ORL.01.AHU01.VAV03.VlvCtl	076ORL - VAV03 - Valve Control
VAV #03 - Fed From AHU01 - Air Flow	076	ORL	1	076ORL.01.AHU01.VAV03.Flow	076ORL - VAV01 - Primary Air Flow

**Program Points - Examples**

Air Handling Unit 1 - System Enable	076	ORL	1	076ORL.01.AHU01.Mode	076ORL - AHU01 - System Enable
Air Handling Unit 1 - Dehumidification Mode	076	ORL	1	076ORL.01.AHU01.DeHumEnbl	076ORL - AHU01 - Dehum Mode
Air Handling Unit 1 - CO2 Loop Integral Gain	076	ORL	1	076ORL.01.AHU01.CO2LoopIG	076ORL - AHU01 - CO2 Loop Integral Gain
Air Handling Unit 1 - CO2 Loop Proportional Gain	076	ORL	1	076ORL.01.AHU01.CO2LoopPG	076ORL - AHU01 - CO2 Loop Proportional Gain
Air Handling Unit 1 - DX Minimum Off Time (Off Delay)	076	ORL	1	076ORL.01.AHU01.DX1OffDly	076ORL - AHU01 - DX Min Off Time
Air Handling Unit 1 - DX Minimum On Time (On Delay)	076	ORL	1	076ORL.01.AHU01.DX1OnDly	076ORL - AHU01 - DX Min On Time
Air Handling Unit 1 - DX Runtime Timer	076	ORL	1	076ORL.01.AHU01.DX1OnTmr	076ORL - AHU01 - DX Runtime Timer
Air Handling Unit 1 - Supply Air Temp Reset - Min Supply Air Temp	076	ORL	1	076ORL.01.AHU01.SAResetSATmpMin	076ORL - AHU01 - SATmp Reset - Min Supply Air Temp
Air Handling Unit 1 - Supply Air Temp Reset - Max Supply Air Temp	076	ORL	1	076ORL.01.AHU01.SAResetSATmpMax	076ORL - AHU01 - SATmp Reset - Max Supply Air Temp
Air Handling Unit 1 - Supply Air Temp Reset - Min Outdoor Air Temp	076	ORL	1	076ORL.01.AHU01.SAResetOATmpMin	076ORL - AHU01 - SATmp Reset - Min Outdoor Air Temp
Air Handling Unit 1 - Supply Air Temp Reset - Max Outdoor Air Temp	076	ORL	1	076ORL.01.AHU01.SAResetOATmpMax	076ORL - AHU01 - SATmp Reset - Max Outdoor Air Temp
Hot Water System System - Boiler 1 - Supply Temperature Reset - Min Supply Water Temp	076	ORL	1	076ORL.01.HWS.Blr1ResetSTmpMin	076ORL - HWS - Blr1 - Temp Reset - Min Supply Temp
Hot Water System System - Boiler 1 - Supply Temperature Reset - Max Supply Water Temp	076	ORL	1	076ORL.01.HWS.Blr1ResetSTmpMax	076ORL - HWS - Blr1 - Temp Reset - Max Supply Temp
Hot Water System System - Boiler 1 - Supply Temperature Reset - Min Outdoor Air Temp	076	ORL	1	076ORL.01.HWS.Blr1ResetOATmpMin	076ORL - HWS - Blr1 - Temp Reset - Min OATemp
Hot Water System System - Boiler 1 - Supply Temperature Reset - Max Outdoor Air Temp	076	ORL	1	076ORL.01.HWS.Blr1ResetOATmpMax	076ORL - HWS - Blr1 - Temp Reset - Max OATemp

**Controller Device Name**

Equipment named after primary control purpose. Where multiple systems are served, the controller model can be referenced. BACnet Descriptions must be assigned.

**Example:**

BACnet Name: 149ERL.01.AHU01

BACnet Description:149ERL – AHU 1 Controller

Where:149 = Building Number;

ERL = Building Acronym;

01 = Floor Number

AHU = Primary Equipment Served

01 = Equipment Number

**Example: Variable Frequency Drive**

BACnet Name: 149ERL.01.AHU01.SAFan\_VFD

BACnet Description:149ERL – AHU1 Supply Fan VFD

BACnet Name:076ORL.01.ChWS.CdWPmp\_VFD

BACnet Description:076ORL – Chilled Water System Cond. Pump VFD

**Example: VAV**

Point Name: 149ERL.01.AHU01.VAV08

**Example: Controlling two AHUs**

Point Name: 149ERL.01.AHU01\_AHU02

**Example: Controlling Multiple Systems:**

**Example: Schneider ASP**

Point Name: 149ERL.01.ASP01

**Example: Siemens PXCM**

Point Name: 149ERL.01.PXCM01

**Example: JACE**

Point Name: 149ERL.01.JACE01

**Example: Terminal Box**

Equipment Name: 149ERL.02.TBP15

Where:149 = Building Number; see key

ERL = Building Identifier; see key

02 = Floor Number

TBP = Terminal Box: Parallel

15 = Terminal Box Number

## Wake County GSA BMS BACnet Instance Naming Convention

### BACnet Instance Numbers 1 to 4194302 (7 digits)

#### XXXXXXX – BACnet Instance Number, where:

- XXX** - Three Digit Building Number
- XX** - Field Panel Controller (11-99 w/ 00 reserved for the server<sup>1</sup>)
- XX** - Device MAC address (00-99 w/ 00 reserved for the Field Panel Controller)<sup>2</sup>

<sup>1</sup> Examples include Network Controllers, AHU controller, Chiller Plant Controller, etc.

<sup>2</sup> Equipment connected or associated with the controller. Example: VAV controllers, VFDs, Chiller BACnet connection, etc.

**Example:** First AHU (or Network Level Controller) in Building 156

**Point Name: 1561100**

Where: 156 = Three Digit Building Number

11 = Field Panel Controller (11-99 w/ 00 reserved for the server)

00 = Device MAC address (00-99 w/ 00 reserved for the Field Panel Controller)

**Example:** Second AHU in Building 156

**Point Name: 1561200**

Where: 156 = Three Digit Building Number

12 = Field Panel Controller (11-99 w/ 00 reserved for the server)

00 = Device MAC address (00-99 w/ 00 reserved for the Field Panel Controller)

**Example:** First VAV associated with the Second AHU controller in Building 156

**Point Name: 1561201**

Where: 156 = Three Digit Building Number

12 = Field Panel Controller (11-99 w/ 00 reserved for the server)

01 = Device MAC address (00-99 w/ 00 reserved for the Field Panel Controller)

### Wake County – Building Name and Number Submittal

<b>Controls Contractor</b>			<b>GSA</b>
<b>Building Name</b>			
<b>Building Number</b>			







**SECTION 23 0993 SEQUENCE OF OPERATION**

**PART 1 - GENERAL**

1.1 SECTION INCLUDES

- A. General.
- B. Air Handling Units.
- C. Terminal Units.
- D. Lighting Controls.

1.2 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
- B. Division 23 Section "Direct Digital Control Systems and Building Automation System (BAS)" General.

1.3 SYSTEM DESCRIPTION

- A. The systems to be controlled under work of this section basically comprise of the following:
  - 1. Add new VAV box terminal units with hot water heat.
- B. This Section defines the manner and method by which controls function.

1.4 SUBMITTALS

- A. Refer to Division 23 Section "Direct Digital Control Systems and Building Automation System" and Division 01 for requirements for control shop drawings, product data, User's Manual, etc.
- B. Programming Manual: Provide DDC system programming manual as well as documentation of site-specific programming prior to the start of construction.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Sequences specified herein indicate the functional intent of the systems operation and may not fully detail every aspect of the programming that may be required to obtain the indicated operation. Contractor shall provide all programming necessary to obtain the sequences/system operation indicated.
- B. Except as specified otherwise, throttling ranges, proportional bands, and cycle differentials shall be centered on the associated setpoint. All modulating feedback control loops shall include the capability of having proportional, integral, and derivative action. Unless the loop is specified "proportional only" or "P+I", Contractor shall apply appropriate elements of integral and derivative gain to each control loop which shall result in stable operation, minimum settling time, and shall maintain the primary variable within the specified maximum allowable variance.
- C. Provide a real time clock and schedule controller with sufficient scheduling capability to schedule all required controllers and sequences. Set up initial schedules in coordination with Wake County.
- D. Wherever a value is indicated as adjustable (adj.), it shall be modifiable, with the proper password level, from the Operator interface. For these points, it is unacceptable to have to modify programming statements to change the setpoint.
- E. Where reset action is specified in a sequence of operation, but a reset schedule is not indicated on the drawings, one of the following methods shall be employed:
  - 1. Contractor shall determine a fixed reset schedule which shall result in stable operation and shall maintain the primary variable within the specified maximum allowable variance.
  - 2. A floating reset algorithm shall be used which increments the secondary variable setpoint (setpoint of control loop being reset) on a periodic basis to maintain primary variable setpoint. The recalculation time and reset increment shall be chosen to maintain the primary variable within the specified maximum allowable variance.
  - 3. Primary variable shall control the devices directly using a PID feedback control loop without resetting the secondary variable. However, the control devices shall still modulate as necessary to maintain upper and lower limits on the secondary variable. Proportional band, integral gain, and derivative term shall be selected to maintain the primary variable within the specified maximum allowable tolerance while minimizing overshoot and settling time. Contractor shall gain prior approval for implementing this method of reset.
- F. Where a supply air temperature or duct pressure setpoint is specified to be reset by the space temperature of the zones calling for the most cooling/heating, the following method shall be employed:
  - 1. A floating reset algorithm shall be used which increments the secondary variable (e.g., supply air temperature or duct pressure) setpoint on a periodic basis to maintain primary variable (e.g. space temperature) setpoint. The reset increment shall be determined by the quantity of "need heat" or "need cool" requests from individual Terminal Equipment Controller (TEC). A TEC "need heat" virtual point shall activate whenever the zone's space temperature falls below the currently applicable (occupied or unoccupied) heating setpoint throttling range. A TEC's "need cool" virtual point shall activate whenever the zone's space temperature rises above the currently applicable (occupied, unoccupied, or economy) cooling setpoint throttling range. The recalculation time and reset increment shall be chosen to maintain the primary variable within the specified maximum allowable variance

while minimizing overshoot and settling time. Reset range maximum and minimum values shall limit the setpoint range.

- G. Where “prove operation” of a device (generally controlled by a digital output) is indicated in the sequence, it shall require that the BAS shall, after an adjustable time delay after the device is commanded to operate (feedback delay), confirm that the device is operational via the status input. If the status point does not confirm operation after the time delay or anytime thereafter for an adjustable time delay (debounce delay) while the device is commanded to run, an alarm shall be enunciated audibly. Upon failure, run command shall be removed and the device shall be locked out until the alarm is manually acknowledged unless specified otherwise.
- H. BAS shall provide for adjustable maximum rates of change for increasing and decreasing output from the following analog output points:
  - 1. Speed control of variable speed drives.
  - 2. Control Reset Loop.
  - 3. Valve Travel Limit.
- I. Wherever a value is indicated to be dependent on another value (i.e.: setpoint plus 5°F) BAS shall use that equation to determine the value. Simply providing a virtual point that the operator must set is unacceptable. In this case three virtual points shall be provided. One to store the parameter (5°F), one to store the setpoint, and one to store the value which is the result of the equation.
- J. VFD Interface: BAS shall monitor the VFD via a direct interface. All available information shall be accessible via the interface for display on the VFD graphic. The VFD Alarm point shall be displayed on the main graphic and shall be alarmed via the BAS. All other points may be displayed on a separate graphic that is selected from this system’s graphic. Reference the VFD chart on the project plans for additional information on points that should be hardwired versus integrated through a direct interface.
- K. All actuators for valves and dampers should be scaled within the controller to operate 0% = closed and 100% = open.
- L. All programming timers should be assigned variables for real-time troubleshooting.
- M. Programming should include adequate comments in order to understand which sections of code perform specific functions.

### 3.2 SINGLE DUCT VAV BOX WITH REHEAT CONTROL

- A. General: Control shall be pressure independent with minimum, maximum and heating maximum flow setpoints, scheduled occupancy with optimum preoccupancy.
- B. Space Temperature Control: Four setpoints shall apply. Normal Heating (70°F adj.), Normal Cooling (74°F adj.), Setback Heating (68°F (adj.)), and setback cooling (78°F). These three values shall be the only values changed by the operator to adjust space temperature setpoint. All other deadbands, differentials, etc. shall be calculated in the program logic (unless another means is provided to prohibit overlap of the heating and cooling loops and ensure a dead band such as function block templates that restrict the setpoint input).
- C. Zone Damper: Zone damper shall modulate in a PI loop to maintain zone volume setpoint.
  - 1. Cooling: The zone volume setpoint shall be reset between the minimum and the cooling maximum volume settings to maintain the space temperature at the cooling space

- temperature setpoint via a PID loop output. The zone volume setpoint shall be reset linearly between the minimum and cooling maximum volume setpoints as the loop output increases from 0 to 100%.
2. Heating: The zone volume setpoint shall be reset between the minimum and the heating maximum volume settings to maintain the space temperature at the heating space temperature setpoint via a PID loop output. Note that a common space heating PID loop output will be used to reset the zone volume setpoint (in the heating mode) and the HW reheat valve (see below). The zone volume setpoint shall be reset linearly between the minimum and heating maximum volume setpoints as the loop output increases from 25 to 100% (adj.).
  3. Dead band: When the space temperature is between the effective space temperature heating and cooling setpoints (heating and cooling PID outputs are both at 0%), the zone volume setpoint shall remain at the minimum flow setpoint.
  4. Zone Volume flow setpoints shall be as scheduled on the drawings.
- D. Hydronic Reheat: Zone reheat coil valve shall modulate in a PID loop output (same loop output that resets the volume setpoint in the heating mode) to maintain the space temperature at the heating setpoint as defined above. The valve shall modulate from 0 to 100% on a PID loop output of 0-75% (adj.). The valve shall be closed whenever ALL the parent air units is off.
- E. Reports:
1. Configure a tabular report using real-time data with the following column headings: VAV TERMINAL DESCRIPTION, ZONE TEMPERATURE, ZONE TEMPERATURE SETPOINT, PRIMARY AIR FLOW, PRIMARY AIR FLOW SETPOINT, DAMPER POSITION (0 to 100% open), REHEAT OUTPUT (0 to 100% heating), DISCHARGE AIR TEMPERATURE.
  2. At the top of the table, list building number, floor or area description if applicable, parent air handling unit designation, air handling unit down duct static pressure and air handler discharge air temperature.
  3. Reference the requirements for summary service screens in the Controls (graphics section) specification for additional information.

### 3.3 LIGHTING SEQUENCE OF OPERATION

- A. Interior:
1. The interior lights will be set up on a separate schedule.
  2. Unless otherwise specified, the schedule will be set up for 2 hours before and 2 hours after scheduled public hours. Confirm schedule with County.

**END OF SECTION 23 0993**

**SECTION 23 2113 - HYDRONIC PIPING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes piping, special-duty valves, and hydronic specialties for hot-water heating.

1.3 DEFINITIONS

- A. DN: Dimension Nominal.
- B. DWV: Drainage, Waste and Vent.
- C. NPS: Nominal Pipe Size.

1.4 SUBMITTALS

- A. Product Data: For each type of special-duty valve indicated. Include flow and pressure drop curves based on manufacturer's testing for diverting fittings, calibrated balancing valves, and automatic flow-control valves. For expansion tanks, air separators and purgers, flexible connectors, and expansion joints.
- B. Shop Drawings: Detail fabrication of pipe anchors, hangers, special pipe support assemblies, alignment guides, expansion joints and loops, and their attachment to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.
- D. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Failed test results and corrective action taken to achieve requirements.
- E. Maintenance Data: For hydronic specialties and special-duty valves to include in maintenance manuals specified in Division 01.
- F. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

**1.5 QUALITY ASSURANCE**

- A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 01.

**1.6 COORDINATION**

- A. Coordinate layout and installation of hydronic piping and piping support system components with other construction, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.
- B. Coordinate pipe fitting pressure classes with products specified in related Sections.

**1.7 EXTRA MATERIALS**

- A. Water Treatment Chemicals: Furnish sufficient chemicals for initial system startup and for preventive maintenance for one year from date of Substantial Completion.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Calibrated Balancing Valves:
    - a. Armstrong Pumps, Inc.
    - b. Flow Design, Inc.
    - c. Gerand Engineering Company.
    - d. Griswold Controls.
    - e. ITT Bell & Gossett; ITT Fluid Technology Corp.
    - f. Taco, Inc.

**2.2 PIPING MATERIALS**

- A. General: Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

**2.3 COPPER TUBE AND FITTINGS**

- A. Type K (Type A) drawn-temper is used for underground installations when the laying lengths exceed available coil lengths and joints are required below grade. Also Type U (Type A) is used when extra wall thickness is necessary for corrosion or pressure considerations.

- B. Drawn-Temper Copper Tubing: ASTM B 88M, Type B (ASTM B 88, Type L), ASTM B 88M Type C (ASTM B 88, Type M) ASTM B 88M, Type A (ASTM B 88, Type K).
- C. Wrought-Copper Fittings: ASME B16.22.
- D. Wrought-Copper Unions: ASME B16.22.
- E. Solder Filler Metals: ASTM B 32, 95-5 tin antimony.
- F. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (silver).

**2.4 STEEL PIPE AND FITTINGS**

- A. Steel Pipe, DN 50 (NPS 2) and Smaller: ASTM A 53, Type S (seamless) or Type F (furnace-butt welded), Grade B, Schedule 40, black steel, plain ends.
- B. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, Schedule 40, black steel; seamless for DN 50 (NPS 2) and smaller and electric-resistance welded for DN 65 (NPS 2-1/2) and larger.
- C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150.
- D. Malleable-Iron Unions: ASME B16.39; Classes 150.
- E. Acceptable Nominal Pipe Sizes: Nominal pipe sizes are restricted to those below: DN 15 (NPS ½) is the smallest size allowable.

DN 15 (NPS ½)	DN 65 (NPS 2-½)
DN 25 (NPS 1)	DN 80 (NPS 3)
DN 32 (NPS 1¼)	DN 100 (NPS 4)
DN 40 (NPS 1½)	DN125 (NPS 5)
DN 50 (NPS 2)	DN150 (NPS 6)

**2.5 VALVES**

- A. Check, ball, and butterfly valves are specified in Division 23 Section "General-Duty Valves for HVAC Piping."
- B. Refer to Part 3 "Valve Applications" Article for applications of each valve.
- C. Calibrated Balancing Valves, DN 50 (NPS 2) and Smaller: Bronze body, ball type, 860-kPa (125-psig) working pressure, 121 deg C (250 deg F) maximum operating temperature, and having threaded ends. Valves shall have calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, and be equipped with a memory stop to retain set position.
- D. Strainers should be installed upstream of these valves, as with any control valve. This type valve will become clogged if one appropriate strainer is not installed. Consider inconvenience of installing new internals if flow valves change.

**2.6 HYDRONIC SPECIALTIES**

- A. Manual Air Vent: Bronze body and nonferrous internal parts; 1035-kPa (150-psig) working pressure; 107 deg C (225 deg F) operating temperature; manually operated with screwdriver or thumbscrew; with DN 6 (NPS 1/8) discharge connection and DN 15 (NPS 1/2) inlet connection.
- B. Automatic Air Vent: Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 1035-kPa (150-psig) working pressure; 116 deg C (240 deg F) operating temperature; with DN 8 (NPS 1/4) discharge connection and DN 15 (NPS 1/2) inlet connection.
- C. Y-Pattern Strainers: 860-kPa (125-psig) working pressure; cast-iron body (ASTM A 126, Class B), flanged ends for DN 65 (NPS 2-1/2) and larger, threaded connections for DN 50 (NPS 2) and smaller, bolted cover, perforated stainless-steel basket, and bottom drain connection.
  - 1. Baskets: Carbon steel.
  - 2. Perforations: 20 mesh.
  - 3. Service Bonnets: with lifting lugs.
  - 4. Accessories:
    - a. Drain connection.
    - b. Vent connection.
    - c. Magnetic plugs or inserts.
    - d. Differential gauge.

**PART 3 - EXECUTION**

**3.1 PIPING APPLICATIONS**

- A. Hot Water: Schedule 40 steel pipe with threaded or Type B (Type L) drawn-temper copper tubing with soldered joints.

**3.2 VALVE APPLICATIONS**

- A. General-Duty Valve Applications: Unless otherwise indicated, use the following valve types:
  - 1. Shutoff Duty: Ball valves.
  - 2. Throttling Duty: Ball valves.
- B. Install shutoff duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, unless only one piece of equipment is connected in the branch line. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, and elsewhere as indicated.
- C. Install calibrated balancing valves in the return water line of each heating or cooling element and elsewhere as required to facilitate system balancing.

**3.3 PIPING INSTALLATIONS**

- A. Install groups of pipes parallel to each other, spaced to permit welding, applying insulation and servicing of valves.



- B. Install drains, consisting of a tee fitting, DN 20 (NPS 3/4) ball valve, and short DN 20 (NPS 3/4) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- C. Install piping at right angles or parallel to building walls. Diagonal runs are prohibited. All piping shall be installed plumb, level, square, and parallel to the building. Piping shall be routed high as possible. All turns shall be made with 90 degree angles.
- D. Install drains, consisting of a tee fitting, DN 20 (NPS 3/4) ball valve, and short DN 20 (NPS 3/4) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- E. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- F. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- G. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe, with the takeoff coming out the bottom of the main pipe. For up-feed risers, install the takeoff coming out the top of the main pipe.
- H. When branch lines are two nominal pipe sizes smaller than the main, integrally reinforced branch welding fitting may be used. Follow the manufacturers written instructions regarding welding procedures, weld passes and cutting holes in the main to form the branch.
- I. Field mitering of pipe to form elbows, tees or any other pipe fitting is not acceptable.

### 3.4 BRANCH LINES

- A. All branches from mains shall be made with factory fittings. Mitering of pipe will not be permitted.

### 3.5 HANGERS AND SUPPORTS

- A. Install the following pipe attachments:
  - 1. Adjustable steel clevis hangers for individual horizontal piping less than 6 m (20 feet) long.
- B. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
  - 1. DN 20 (NPS 3/4): Maximum span, 2.1 m (7 feet); minimum rod size, 6.4 mm (1/4 inch).
  - 2. DN 25 (NPS 1): Maximum span, 2.1 m (7 feet); minimum rod size, 6.4 mm (1/4 inch).
  - 3. DN 40 (NPS 1-1/2): Maximum span, 2.7 m (9 feet); minimum rod size, 10 mm (3/8 inch).
  - 4. DN 50 (NPS 2): Maximum span, 3 m (10 feet); minimum rod size, 10 mm (3/8 inch).
  - 5. DN 65 (NPS 2-1/2): Maximum span, 3.4 m (11 feet); minimum rod size, 10 mm (3/8 inch).
- C. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
  - 1. DN 20 (NPS 3/4): Maximum span, 1.5 m (5 feet); minimum rod size, 6.4 mm (1/4 inch).
  - 2. DN 25 (NPS 1): Maximum span, 1.8 m (6 feet); minimum rod size, 6.4 mm (1/4 inch).
  - 3. DN 40 (NPS 1-1/2): Maximum span, 2.4 m (8 feet); minimum rod size, 10 mm (3/8 inch).
  - 4. DN 50 (NPS 2): Maximum span, 2.4 m (8 feet); minimum rod size, 10 mm (3/8 inch).
  - 5. DN 65 (NPS 2-1/2): Maximum span, 2.7 m (9 feet); minimum rod size, 10 mm (3/8 inch).

- D. Support vertical runs at roof, at each floor, and at 3 m (10 foot) intervals between floors.

### 3.6 HYDRONIC SPECIALTIES INSTALLATION

- A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.
- B. Install automatic air vents in mechanical equipment rooms only at high points of system piping, at heat-transfer coils, and elsewhere as required for system air venting.

### 3.7 TERMINAL EQUIPMENT CONNECTIONS

- A. Size for supply and return piping connections shall be, at a minimum, the same size as the equipment connections, install the runouts the size indicated on the plans.
- B. Install control valves in accessible locations close to connected equipment. Install control valves in hot lines at a 30 degree angle minimum. Support the actuator when valves are not installed with the actuator in a vertical position.

### 3.8 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
  - 1. Leave joints, including welds, uninsulated and exposed for examination during test.
  - 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
  - 3. Flush system with clean water. Clean strainers.
  - 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
  - 5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on hydronic piping:
  - 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
  - 2. While filling system, use vents installed at high points of system to release trapped air. Use drains installed at low points for complete draining of liquid.
  - 3. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, "Building Services Piping."
  - 4. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
  - 5. Prepare written report of testing.

**3.9 ADJUSTING**

- A. Perform these adjustments before operating the system:
  - 1. Open valves to fully open position. Close coil bypass valves.
  - 2. Check air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
  - 3. Set temperature controls so all coils are calling for full flow.

**3.10 CLEANING**

- A. Flush hydronic piping systems with clean water. Remove and clean or replace strainer screens. After cleaning and flushing hydronic piping systems.

**END OF SECTION 23 2113**



**SECTION 23 3113 - METAL DUCTS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Single-wall rectangular ducts and fittings.
  - 2. Sheet metal materials.
  - 3. Sealants and gaskets.
  - 4. Hangers and supports.

**PART 2 - PRODUCTS**

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

### 2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G90 (Z275).
  - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- D. Tie Rods: Galvanized steel, 1/4 inch (6 mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8 inch (10 mm) minimum diameter for lengths longer than 36 inches (900 mm).

### 2.4 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
  - 1. Application Method: Brush on.
  - 2. Solids Content: Minimum 65 percent.
  - 3. Shore A Hardness: Minimum 20.
  - 4. Water resistant.
  - 5. Mold and mildew resistant.
  - 6. VOC: Maximum 420 g/L (less water).
  - 7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
  - 8. Service: Indoor or outdoor.
  - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

- C. Flanged Joint Sealant: Comply with ASTM C 920.
  - 1. General: Single-component, acid-curing, silicone, elastomeric.
  - 2. Type: S.
  - 3. Grade: NS.
  - 4. Class: 25.
  - 5. Use: O.
  - 6. For indoor applications, use sealant that has a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

## 2.5 SPIRAL DUCT

- A. Spiral duct and fittings shall be manufactured from G-60 galvanized steel meeting ASTM-A527 requirements. Finish shall be mill phosphatized steel with "paint grip."
- B. Branch connections shall be made with 45-degree straight taps. All branch connections shall be made as a separate fitting. Factory or field installation of taps into spiral duct shall not be allowed without written approval of the engineer.
- C. All elbows shall be fabricated with a centerline radius of 1.5 times the diameter. 90-degree elbows shall be stamped or pleated elbows.
- D. Supports shall be aircraft cable.
- E. Double wall duct shall be constructed of an outer shell, a 1" thick layer of fiberglass insulation and a perforated inner metal liner. Insulation shall have a thermal conductivity "K" factor of .26 BTU/hr/sq.ft./degree F or less.
  - 1. The inner metal liner shall be perforated. The longitudinal seam outer pipe shall be solid metal. All fittings shall have a solid metal liner.

## 2.6 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports:
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

**PART 3 - EXECUTION**

**3.1 DUCT INSTALLATION**

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved.
- B. Install ducts at right angles or parallel to building walls. Diagonal runs are prohibited. All ductwork shall be installed plumb, level, square, and parallel to the building. Ductwork shall be routed high as possible.
- C. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- D. Install round ducts in maximum practical lengths.
- E. Install ducts with fewest possible joints.
- F. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- G. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- I. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.
- J. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Duct Accessories" for fire and smoke dampers.
- K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."

**3.2 DUCT SEALING**

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

**3.3 HANGER AND SUPPORT INSTALLATION**

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and



supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

- C. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).
- D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

### 3.4 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

### 3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Duct System Cleanliness Tests:
  - 1. Visually inspect duct system to ensure that no visible contaminants are present.
- C. Duct system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

### 3.6 DUCT CLEANING

- A. Clean new and existing duct system(s) before testing, adjusting, and balancing.
- B. Clean the following components by removing surface contaminants and deposits:
  - 1. Air outlets and inlets (registers, grilles, and diffusers).
  - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
  - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
  - 4. Coils and related components.
  - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
  - 6. Supply-air ducts, dampers, actuators, and turning vanes.
  - 7. Dedicated exhaust and ventilation components and makeup air systems.

**3.7 START UP**

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

**3.8 DUCT SCHEDULE**

**A. Supply Ducts:**

**1. Ducts Connected to Terminal Units:**

- a. Pressure Class: Positive 1-inch wg (250 Pa).
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 6.
- d. SMACNA Leakage Class for Round: 3.

**2. Ducts Connected to Air-Handling Units:**

- a. Pressure Class: Positive 3-inch wg (750 Pa).
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 6.
- d. SMACNA Leakage Class for Round: 3.

**B. Elbow Configuration:**

- 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
- 2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-3, "Round Duct Elbows."

**C. Branch Configuration:**

- 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-6, "Branch Connections."
  - a. Rectangular Main to Rectangular Branch: 45-degree entry.
  - b. Rectangular Main to Round Branch: Spin in.
- 2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees." Saddle taps are permitted in existing duct.

**END OF SECTION 23 3113**

**SECTION 23 3300 - DUCT ACCESSORIES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Manual volume dampers.
  - 2. Fire dampers.
  - 3. Combination fire and smoke dampers.
  - 4. Turning vanes.
  - 5. Duct-mounted access doors.
  - 6. Flexible connectors.
  - 7. Flexible ducts.
  - 8. Duct accessory hardware.

1.3 SUBMITTALS

- A. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
  - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
    - a. Special fittings.
    - b. Manual volume damper installations.
    - c. Control damper installations.
    - d. Fire-damper, including sleeves; and duct-mounted access doors and remote damper operators.
    - e. Wiring Diagrams: For power, signal, and control wiring.
- B. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G90 (Z275).
  - 2. Exposed-Surface Finish: Mill phosphatized.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

**2.2 MANUAL VOLUME DAMPERS**

- A. Standard, Steel, Manual Volume Dampers:
  - 1. Standard leakage rating.
  - 2. Suitable for horizontal or vertical applications.
  - 3. Frames:
    - a. Hat-shaped, galvanized-steel channels, 0.064-inch (1.62-mm) minimum thickness.
    - b. Mitered and welded corners.
    - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
  - 4. Blades:
    - a. Multiple or single blade.
    - b. Opposed-blade design.
    - c. Stiffen damper blades for stability.
    - d. Galvanized-steel, 0.064 inch (1.62 mm) thick.
  - 5. Blade Axles: Galvanized steel.
  - 6. Bearings:
    - a. Oil-impregnated bronze.
    - b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
  - 7. Tie Bars and Brackets: Galvanized steel.
- B. Jackshaft:
  - 1. Size: 1-inch (25-mm) diameter.
  - 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.

3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

C. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- (2.4-mm-) thick zinc-plated steel, and a 3/4-inch (19-mm) hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

**2.3 FIRE DAMPERS**

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Arrow United Industries; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Nailor Industries Inc.
4. NCA Manufacturing, Inc.
5. Ruskin Company.

B. Type: Static; rated and labeled according to UL 555 by an NRTL.

C. Fire Rating: 1-1/2 hours.

D. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch (1.3 or 3.5 mm) thick, as indicated, and of length to suit application.
2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.

F. Mounting Orientation: Vertical or horizontal as indicated.

G. Blades: Roll-formed, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.

H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

I. Heat-Responsive Device: Replaceable, 165 deg F (74 deg C) rated, fusible links.

**2.4 COMBINATION FIRE AND SMOKE DAMPERS**

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.

3. Greenheck Fan Corporation.
  4. Nailor Industries Inc.
  5. Ruskin Company.
- B. Type: Static; rated and labeled according to UL 555 and UL 555S by an NRTL.
- C. Closing rating in ducts up to 4-inch wg (1-kPa) static pressure class and minimum 2000-fpm (10-m/s) velocity.
- D. Fire Rating: 1-1/2 hours.
- E. Frame: 5" x 16 gage galvanized, hat-shaped channel, structurally superior to 13 gage channel frame.
- F. Heat-Responsive Device: Electric resettable link and switch package, factory installed, rated.
- G. Smoke Detector: Provided as part of fire alarm system and shall be compatible with fire alarm system.
- H. Blades: Airfoil-shaped, double skin, single piece construction with 14 gage galvanized metal, maximum 6" wide.
- I. Leakage: Class I.
- J. Rated pressure and velocity to exceed design airflow conditions.
- K. Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized sheet steel; length to suit wall application.
- L. Actuator: Shall be factory matched and supplied in accordance with UL-555S; electrical connection, 115 V, single phase, 60 Hz; device shall be compatible with the fire alarm system.

## 2.5 TURNING VANES

- A. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- B. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vaness and Vane Runners," and 2-4, "Vane Support in Elbows."
- C. Vane Construction: Single wall.
- D. Vane Construction: Single wall for ducts up to 48 inches (1200 mm) wide and double wall for larger dimensions.

## 2.6 DUCT-MOUNTED ACCESS DOORS

- A. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."
1. Door:

- a. Double wall, rectangular.
  - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
  - c. Hinges and Latches: 1-by-1-inch (25-by-25-mm) butt or piano hinge and cam latches.
  - d. Fabricate doors airtight and suitable for duct pressure class.
2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
  3. Number of Hinges and Locks:
    - a. Access Doors Less Than 12 Inches (300 mm) Square: No hinges and two sash locks.
    - b. Access Doors up to 18 Inches (460 mm) Square: Two hinges and two sash locks.

## 2.7 FLEXIBLE CONNECTORS

- A. Materials: Flame-retardant or noncombustible fabrics.
- B. Coatings and Adhesives: Comply with UL 181, Class 1.
- C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches (89 mm) wide attached to 2 strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized sheet steel or 0.032-inch- (0.8-mm-) thick aluminum sheets. Provide metal compatible with connected ducts.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
  1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
  2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp and 360 lbf/inch (63 N/mm) in the filling.
  3. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).

## 2.8 FLEXIBLE DUCTS

- A. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
  1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
  2. Maximum Air Velocity: 4000 fpm (20 m/s).
  3. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
  4. Insulation R-value: Comply with ASHRAE/IESNA 90.1-2004.
- B. Flexible Duct Connectors:
  1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches (75 through 460 mm), to suit duct size.

## 2.9 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel.
- C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
  - 1. Install steel volume dampers in steel ducts.
- D. Set dampers to fully open position before testing, adjusting, and balancing.
- E. Install fire and smoke dampers according to UL listing.
- F. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
  - 1. On both sides of duct coils.
  - 2. Adjacent to and close enough to fire dampers, to reset or reinstall fusible links. Access doors for access to fire dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
  - 3. Control devices requiring inspection.
  - 4. Elsewhere as indicated.
- G. Access Door Sizes:
  - 1. One-Hand or Inspection Access: 8 by 5 inches (200 by 125 mm).
  - 2. Two-Hand Access: 12 by 6 inches (300 by 150 mm).
  - 3. Head and Hand Access: 18 by 10 inches (460 by 250 mm).
  - 4. Head and Shoulders Access: 21 by 14 inches (530 by 355 mm).
- H. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- I. Install flexible connectors to connect ducts to equipment.
- J. Connect diffusers or light troffer boots to ducts with maximum 60-inch (1500-mm) lengths of flexible duct clamped or strapped in place.
- K. Connect flexible ducts to metal ducts with liquid adhesive plus draw tape.
- L. Install duct test holes where required for testing and balancing purposes.



**3.2 FIELD QUALITY CONTROL**

**A. Tests and Inspections:**

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

**END OF SECTION 23 3300**



**SECTION 23 3600 - AIR TERMINAL UNITS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Air terminal units.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, include rated capacities, furnished specialties, sound-power ratings, and accessories.
- B. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. NFPA Compliance: Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 AIR TERMINAL UNITS

- A. Manufacturers:
  - 1. Carnes.

2. Nailor Industries of Texas Inc.
  3. Titus.
  4. Trane Co. (The); Worldwide Applied Systems Group.
- B. Configuration: Volume-damper assembly and fan in series or in parallel arrangement inside unit casing with control components inside a protective metal shroud.
- C. Casing: 0.034-inch (0.85-mm) steel.
1. Casing Lining: 1/2-inch- (13-mm-) thick, coated, foil face, fibrous-glass duct liner complying with ASTM C 1071; secured with adhesive.
  2. Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
  3. Air Outlet: S-slip and drive connections.
  4. Access: Removable panels for access to dampers and other parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
- D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg (750-Pa) inlet static pressure.
  2. Damper Position: Normally closed.
- E. Regulator Assembly: Extruded-aluminum or galvanized-steel components; key damper blades onto shaft with nylon-fitted pivot points located inside unit casing.
1. Automatic Flow-Control Assembly: Combined spring rates shall be matched for each volume-regulator size with machined dashpot for stable operation.
  2. Factory-calibrated and field-adjustable assembly with shaft extension for connection to externally mounted control actuator.
- F. Attenuator Section: 0.034-inch (0.85-mm) steel sheet metal.
1. Lining: 1/2-inch- (13-mm-) thick, coated, foil face, fibrous-glass duct liner complying with ASTM C 1071; secured with adhesive.
- G. Hot-Water Heating Coil: Copper tube, mechanically expanded into aluminum-plate fins; leak tested underwater to 200 psig (1380 kPa); and factory installed.
- H. Factory-Mounted and -Wired Controls: Electrical components shall be mounted in control box with removable cover. Incorporate single-point electrical connection to power source.
1. Control Transformer: Factory mounted for control voltage on electric and electronic control units with terminal strip in control box for field wiring of thermostat and power source.
  2. Wiring Terminations: Fan and controls to terminal strip, and terminal lugs shall match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box that is sized according to NFPA 70.
  3. Disconnect Switch: Factory-mounted, fused type.
- I. Electronic Controls: Bidirectional damper operator and microprocessor-based controller with integral airflow transducer and room sensor shall be compatible with temperature controls specified in Division 23 Sections. Communication with temperature-control system specified in Division 23 Sections.

### **PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install air terminal units' level and plumb. Maintain sufficient clearance for normal service and maintenance.
- B. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- C. Install piping adjacent to air terminal units to allow service and maintenance.
- D. Hot-Water Piping: In addition to requirements in Division 23 Section "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.

**3.2 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
  - 2. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace malfunctioning units and retest as specified above.

**END OF SECTION 23 3600**



**SECTION 23 3713 - DIFFUSERS, REGISTERS, AND GRILLES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Square Ceiling Diffuser.
  - 2. Linear Slots Supply Diffusers
  - 3. Sidewall Supply Diffusers
  - 4. Exhaust Grilles.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
  - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
  - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.
- B. Samples: For each exposed product and for each color and texture specified.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Manufacturers:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Anemostat.
    - b. METALAIRE, Inc.
    - c. Nailor Industries Inc.
    - d. Price Industries.
    - e. Titus.
    - f. Krueger.

**2.2 SUPPLY DIFFUSERS**

**A. Square Ceiling Diffuser:**

1. Material: Aluminum.
2. Finish: Baked enamel, white.
3. Face Style: Flush Four cone.
4. Mounting: Provide inverted T-bar type frame for lay-in ceiling. Plaster frame for gypsum board ceiling.
5. Pattern: Fixed, horizontal discharge.
6. Dampers: Opposed blade.

**2.3 REGISTERS AND GRILLES**

**A. Return Grille:**

1. Material: Aluminum.
2. Finish: Baked enamel, white.
3. Face Arrangement: 1/2-by-1/2-by-1-inch (13-by-13-by-26-mm) grid core.
4. Frame: Provide inverted T-bar type frame for lay-in ceiling. Surface mount for gypsum board ceiling.
5. Mounting: Lay-in.

**B. Exhaust Grille:**

1. Material: Aluminum.
2. Finish: Baked enamel, white.
3. Face Arrangement: 1/2-by-1/2-by-1-inch (13-by-13-by-26-mm) grid core.
4. Frame: Provide inverted T-bar type frame for lay-in ceiling. Surface mount for gypsum board ceiling.
5. Mounting: Lay-in.
6. Dampers: Opposed blade.

**2.4 LINEAR SLOT SUPPLY DIFFUSERS**

**A. Continuous wide slot, one, two, three, or 4 slots wide.**

1. Material: Aluminum.
2. Finish: Baked enamel, White.
3. Finish - Pattern Controller: Baked enamel, black.
4. Finish - Tees: Baked enamel, white.
5. Frame: Lay-in
6. Mounting: Lay-in
7. Slot Width: Indicated on Drawings
8. Number of Slots: Indicated on Drawings.
9. Length: Indicated on Drawings.
10. Accessories: T-bar slot with insulated plenum.



**2.5 SIDEWALL SUPPLY DIFFUSERS**

**A. Adjustable Bar Type:**

1. Material: Aluminum.
2. Finish: Baked enamel, White.
3. Blades: Airfoil Type.
4. Front Blade Arrangement: Adjustable horizontal (Long dimension) spacing  $\frac{3}{4}$ " apart.
5. Rear Blade Arrangement: Adjustable vertical (short dimension) spacing  $\frac{3}{4}$ " apart.
6. Frame: 1-1/4" wide.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

**3.2 ADJUSTING**

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

**END OF SECTION 23 3713**



**SECTION 26 0100 - BASIC ELECTRICAL MATERIALS AND METHODS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Connectors.
  - 2. Supporting devices for electrical components.
  - 3. Cutting and patching for electrical construction.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.4 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings for electrical supports, raceways, and cable with general construction work.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the work.
- C. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces.
- D. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- E. Coordination Drawings: Contractor shall prepare plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ductwork, sprinkler pipework, hydronic pipework, ceiling components, Structural members, Lighting fixtures, Air outlets and inlets, Speakers, Sprinklers, fire alarm devices, and any other item that may restrict or limit the installation of the system.

**PART 2 - PRODUCTS**

**2.1 SUPPORTING DEVICES**

- A. Material: Cold-formed steel, with corrosion-resistant coating.
- B. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- C. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- D. Expansion Anchors: Carbon-steel wedge or sleeve type.
- E. Toggle Bolts: All-steel springhead type.
- F. Powder-Driven Threaded Studs: Heat-treated steel.

**2.2 ELECTRICAL IDENTIFICATION**

- A. See Division 26 Section "Identification for Electrical Systems."

**PART 3 - EXECUTION**

**3.1 ELECTRICAL EQUIPMENT INSTALLATION**

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom.
- B. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- C. Right of Way: Give to raceways and piping systems installed at a required slope.

**3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION**

- A. Dry Locations: Steel materials.
- B. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four with, 200 lb (90 kg) minimum design load for each support element.

**3.3 SUPPORTING INSTALLATION**

- A. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- B. Size supports for multiple raceway or cable runs so capacity can be increased by a 25 percent minimum in the future.
- C. Support individual horizontal single raceways with separate, malleable-iron pipe hangers or clamps except use spring-steel fasteners for 1-1/2 inch (38 mm) and smaller single raceways above suspended ceilings and for fastening raceways to slotted channel and angle supports.

- D. Install sleeves for cable and raceway penetrations of walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated wall assemblies.
- E. Secure electrical items and their supports to building structure, using the following methods unless other fastening methods are indicated.
  - 1. Gypsum Board: Toggle bolts. Seal around sleeves with joint compound, both sides of wall.
  - 2. Masonry: Toggle bolts on hollow block and expansion bolts on solid block. Seal around sleeves with mortar, both sides of wall.
  - 3. Structural Steel: Welded threaded studs, Spring-tension clamps, Threaded studs driven by powder charge and provided with lock washers.
    - a. Comply with AWS D1.1 for field welding.
  - 4. Light Steel Framing: Sheet metal screws.
  - 5. Light Steel: Sheet-metal screws.
  - 6. Fasteners: Select so load applied to each fastener does not exceed 25 percent of its proof-test load.
- F. Metallic conduit shall not be used for hanger support material.

### 3.4 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.

### 3.5 FIRESTOPPING

- A. Apply firestopping to cable and raceway sleeves and other penetrations of fire-rated wall assemblies to restore original undisturbed fire-resistance ratings of assemblies.

### 3.6 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair, refinish and touch up disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. All work to be executed by skilled mechanics.

**END OF SECTION 26 0100**



**SECTION 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes building wires and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

- A. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 CONDUCTORS

- A. Manufacturers:
  - 1. American Insulated Wire Corp.; a Leviton Company.
  - 2. General Cable Corporation.
  - 3. Senator Wire & Cable Company.
  - 4. Southwire Company.

- B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.
- C. Conductor Material: Copper, solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.
- D. Conductor Insulation Types: Type THHN-THWN.

**2.3 CONDUCTORS AND SPLICES**

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc.
  - 2. AMP Incorporated/Tyco International.
  - 3. Hubbell/Anderson.
  - 4. O-Z/Gedney; EGS Electrical Group LLC.
  - 5. 3M Company; Electrical Products Division.
  - 6. Encore Wire Corporation.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

**PART 3 - EXECUTION**

**3.1 CONDUCTOR AND INSULATION APPLICATIONS**

- A. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- B. No "common" neutral conductors are to be used for multiple circuits.

**3.2 CONDUCTOR AND INSULATION APPLICATIONS**

- A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- B. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- C. Identify and color-code conductors according to Division 26 Section "Identification for Electrical Systems."
- D. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- E. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.
- F. Wiring to devices shall not exceed the UL rating for the device.



**3.3 FIELD QUALITY CONTROL**

- A. Testing: Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Test Reports: When requested, prepare a written report to record the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

**END OF SECTION 26 0519**



**SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes grounding of electrical systems and equipment. Requirements specified in this Section may be supplemented by requirements of other Sections.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled under UL 467 as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. O-Z/Gedney Co.; a business of the EGS Electrical Group.
  - 2. Raco, Inc.; Division of Hubbell.
  - 3. Superior Grounding Systems, Inc.
  - 4. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Division 26 Section "Low-Voltage Electrical Power Conductors."
- B. Equipment Grounding Conductors: Insulated with green-colored insulation.
- C. Connectors: Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. In raceways, use insulated equipment grounding conductors.
- B. Equipment Grounding Conductors: Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
  - 1. Install insulated equipment grounding conductors in feeders, branch circuits and receptacle circuits.
  - 2. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 6 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location. Terminate in junction box with 6" pigtail.
- C. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- D. Connections: Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
  - 1. Make connections with clean, bare metal at points of contact.
  - 2. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
  - 3. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
  - 4. Non-contact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
  - 5. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

**END OF SECTION 26 0526**

**SECTION 26 0533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. See Division 26 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.
- C. See Division 26 Section "Wiring Devices" for devices installed in boxes.

1.3 SUBMITTALS

- A. Product Data: For surface raceways and fittings.
- B. Shop Drawings: Show fabrication and installation details of components for raceways, fittings, and boxes.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

**2.2 METAL CONDUIT AND TUBING**

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc.
  - 2. Electri-Flex Co.
  - 3. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
  - 4. O-Z Gedney; Unit of General Signal.
  - 5. Wheatland Tube Co.
- B. Rigid Steel Conduit: ANSI C80.1
- C. EMT and Fittings: ANSI C80.3.
  - 1. Fittings: Compression type.
- D. Colored EMT: ANSI C80.3.
  - 1. Fittings: Compression type.
  - 2. Color: Conduit shall be factory galvanized with pigmented coating. Color shall match Wake County standard.
- E. LFMC: Flexible steel conduit with PVC jacket.
- F. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

**2.3 BOXES, ENCLOSURES, AND CABINETS**

- A. Manufacturers:
  - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
  - 2. Emerson/General Signal; Appleton Electric Company.
  - 3. Hoffman.
  - 4. Hubbell, Inc.; Killark Electric Manufacturing Co.
  - 5. O-Z/Gedney; Unit of General Signal.
  - 6. RACO; Division of Hubbell, Inc.
  - 7. Robroy Industries, Inc.; Enclosure Division.
  - 8. Thomas & Betts Corporation.
  - 9. Walker Systems, Inc.; Wiremold Company (The).
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- F. See drawings for additional specifications.

**2.4 FACTORY FINISHES**

- A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping, unless specified otherwise.

**PART 3 - EXECUTION**

**3.1 RACEWAY APPLICATION**

- A. Indoors:
  - 1. Concealed: Colored EMT. Color to match Wake County standard.
  - 2. Exposed: Colored EMT. Color to match Wake County standard.
  - 3. Boxes and Enclosures: NEMA 250, Type 1.
- B. Minimum Raceway Size: 3/4-inch trade size (DN 21).
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. EMT Conduit: Compression type, insulated bushings.
- D. MC Cable or AC cable is not acceptable under no conditions.

**3.2 INSTALLATION**

- A. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- B. Complete raceway installation before starting conductor installation.
- C. Install conduit at right angles or parallel to building walls. Diagonal runs are prohibited. All conduit shall be installed plumb, level, square, and parallel to the building. Conduit shall be routed high as possible.
- D. Support raceways as specified in Division 26 Section "Basic Electrical Materials and Methods."
- E. Install temporary closures to prevent foreign matter from entering raceways.
- F. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- G. Conceal conduit and EMT within finished walls, and ceilings, unless otherwise indicated.
  - 1. Install concealed raceways with a minimum of bends in shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- H. Join raceways with fittings designed and approved for that purpose and make joints tight.
  - 1. Use insulating bushings to protect conductors.
  - 2. All stubbed above ceiling conduits to have compression style couplers with insulated bushings.

- I. Terminations:
  - 1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
  - 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200 lb (90 kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Tied off each end. Label all unused conduits.
- K. Telephone and Signal System Raceways, 2-Inch Trade Size (DN 53) and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
  - 1. Where otherwise required by NFPA 70.

### 3.3 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

**END OF SECTION 26 0533**



**SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Schedule of Nomenclature: An index of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with ANSI A13.1 and NFPA 70 for color-coding.

**PART 2 - PRODUCTS**

2.1 RACEWAY AND CABLE LABELS

- A. Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
  - 1. Color: Black letters on orange field.
  - 2. Legend: Indicates voltage and service.
  - 3. Other colors excepted when required.
- B. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl with legend overlaminated with a clear, weather- and chemical-resistant coating.
- C. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide (0.08 mm thick by 25 to 51 mm wide).

- D. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

## 2.2 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.
  - 1. Minimum Width: 3/16 inch (5 mm).
  - 2. Tensile Strength: 50 lb (22.3 kg) minimum.
  - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
  - 4. Color: According to color-coding.
- B. Paint: Formulated for the type of surface and intended use.
  - 1. Primer for Galvanized Metal: Single-component acrylic vehicle formulated for galvanized surfaces.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.
- C. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before applying.
- E. Install painted identification according to manufacturer's written instructions and as follows:
  - 1. Clean surfaces of dust, loose material, and oily films before painting.
  - 2. Prime surfaces using type of primer specified for surface.
  - 3. Apply one intermediate and one finish coat of enamel.
- F. All conduit shall be colored. Color shall match Wake County standard.
- G. Color Raceways:
  - 1. The following colors should be used for the systems listed below:
    - a. Security System: Color shall match Wake County standard.
    - b. Telecommunication System: Color shall match Wake County standard.
    - c. 120/208 Volt System: Color shall match Wake County standard.
    - d. 227/480 Volt System: Color shall match Wake County standard.

- H. Circuit Identification Labels on Boxes: Install labels externally.
  - 1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.
  - 2. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.
  
- I. Color-Coding of Secondary Phase Conductors: Use the following colors for service, feeder and branch-circuit phase conductors:
  - 1. 208/120-V Conductors:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
  
  - 2. 480/277-V Conductors
    - a. Phase A: Brown.
    - b. Phase B: Orange.
    - c. Phase C: Yellow.
  
  - 3. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG:
    - a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1 inch (25 mm) wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.
    - b. Colored cable ties applied in groups of three ties of specified color to each wire at each terminal or splice point starting 3 inches (76 mm) from the terminal and spaced 3 inches (76 mm) apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.

**END OF SECTION 26 0553**



## SECTION 26 0923 - LIGHTING CONTROL DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Lighting contactors.

#### 1.3 ACTION SUBMITTALS

- A. Product Data:
  - 1. Lighting contactors.
- B. Shop Drawings:
  - 1. Show installation details
  - 2. Interconnection diagrams showing field-installed wiring.
  - 3. Include diagrams for power, signal, and control wiring.

### PART 2 - PRODUCTS

#### 2.1 LIGHTING CONTACTORS

- A. Description: Electrically operated and **mechanically** held, lighting contactor, 30-amp, 120 Volt, 60 Hz, NEMA 1, Painted steel, 12-pole, mechanical held and MAG latched, non-combination electrically and mechanically held with door mounted "hand-off-auto" switch, red run pilot light and green ready pilot, complying with NEMA ICS 2 and UL 508.
  - 1. Enclosure: Comply with NEMA 250.
  - 2. Provide with control and pilot devices as **indicated**, matching the NEMA type specified for the enclosure.
- B. Interface with DDC System for HVAC: Provide hardware interface to enable the DDC system for HVAC to monitor and control lighting contactors. Coordinate coil voltage with DDC Control Contractor.
- C. Acceptable Manufacturers: Eaton, Model ECC04C1ABA-S3P23P25 or engineer approved equal by Square D or GE.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- B. Examine walls for suitable conditions where lighting control devices will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION OF CONTACTORS**

- A. Mount contactors in accordance with manufacturer written instruction.

**3.3 INSTALLATION OF WIRING**

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors." Minimum conduit size is 3/4 inch.
- B. Coordinate interface and operation with DDC Control contractor.

**3.4 IDENTIFICATION**

- A. Identify components and power and control wiring in accordance with Division 26 Section "Identification for Electrical Systems."
  - 1. Identify controlled circuits in lighting contactors.
- B. Label contactors with a unique designation.

**END OF SECTION 26 0923**

**SECTION 26 2726 - WIRING DEVICES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Duplex receptacles.
  - 2. Single-pole snap switches.
  - 3. Occupancy sensing switches.
  - 4. Dimmers
  - 5. Device wall plates.
  - 6. Poke-Thru Assembles

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Wiring Devices:

- a. Bryant Electric, Inc./Hubbell Subsidiary.
- b. Eagle Electric Manufacturing Co., Inc.
- c. Hubbell Incorporated; Wiring Device-Kellems.
- d. Leviton Mfg. Company Inc.
- e. Pass & Seymour/Legrand; Wiring Devices Div.

## 2.2 RECEPTACLES

### A. Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R heavy-duty.
3. Standards: Comply with UL 498 and FS W-C-596.

### B. Duplex GFCI Receptacles, 125 V, 20 A:

1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: Feed through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

### C. Duplex and USB Charging Receptacles:

1. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.
2. Line Voltage Receptacles: Two pole, three wire, and self-grounding; NEMA WD 6, Configuration 5-20R.
3. USB Receptacles: Dual USB Type A, 5 V dc, and 3.6 A per receptacle (minimum).
4. Standards: Comply with UL 498, UL 1310, USB 3.0 devices, and FS W-C-596.

## 2.3 SWITCHES

### A. Single & Double- Pole Switches, 120/277 V, 20 A:

1. Standards: Comply with UL 20 and FS W-S-896.

### B. Three-Way Switches, 120/277 V, 20 A:

1. Comply with UL 20 and FS W-S-896.

### C. Single- and Double-Pole Switches: 20 amp rated, comply with DSCC W-C-896F and UL 20.

### D. Snap Switches: Heavy-Duty grade, quiet type, minimum 20 amp rated.

## 2.4 DIMMERS

### A. Dimmers:

1. Description: Modular, full-wave, solid-state dimmer switch with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
2. Control: Continuously adjustable slider; with single-pole or three-way switching.



3. Standards: Comply with UL 1472.
4. Voltage: Dual voltage - 120 and 277 V.
5. Dimmer: Zero-10 volt wall switch. The device shall fit in a standard single gang switch box. Device allows the user to increase or decrease the lighting level via 0-10 Vdc output. Device shall be compatible with drives and controller. DIP switch settings enable a variety of control options. Buttons or slide control.
6. Switch Rating: Not less than LED load at 120 V, 1200-VA ballast or LED load at 277 V,

## 2.5 OCCUPANCY SENSORS

### A. General Requirements for Sensors:

1. Wall & Ceiling-mounted, solid-state indoor occupancy sensors.
2. Dual technology.
3. Integrated or Separate power pack.
4. Hardwired connection to switch or dimmer.
5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. Operation:
  - a. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 20 minutes.
7. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
8. Power: Line voltage.
9. Power Pack: Dry contacts rated for 20-A LED load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
10. Mounting:
  - a. Sensor: Suitable for mounting in any position on a standard outlet box.
  - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
  - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
12. Bypass Switch: Override the "on" function in case of sensor failure.

### B. Dual-Technology Type: Wall and Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over a 15 foot radius when mounted 48 inches (1200 mm) above finished floor.

C. Wall-Switch Sensor:

1. General: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox, using hardwired connection.
2. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft. (84 sq. m).
3. Standards: Comply with UL 20.
4. Sensing Technology: Dual technology - PIR and ultrasonic.
5. Capable of controlling load in three-way application.
6. Voltage: Dual voltage - 120 and 277 V.
7. Concealed, field-adjustable, "off" time-delay selector at up to 20 minutes.
8. Switch Rating: Not less than 800-VA ballast or LED load at 120 V, 1200-VA ballast or LED load at 277 V, and 800-W incandescent.

D. Wall-Switch Sensor with Built-in Dimmer:

1. General: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox, using hardwired connection.
2. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft. (84 sq. m).
3. Standards: Comply with UL 20.
4. Sensing Technology: Dual technology - PIR and ultrasonic.
5. Capable of controlling load in three-way application.
6. Voltage: Dual voltage - 120 and 277 V.
7. Concealed, field-adjustable, "off" time-delay selector at up to 20 minutes.
8. Dimmer: Zero-10 volt wall switch. The device shall fit in a standard single gang switch box. Device allows the user to increase or decrease the lighting level via 0-10 Vdc output. Device shall be compatible with drives and controller. DIP switch settings enable a variety of control options. Buttons or slide control.
9. Switch Rating: Not less than 800-VA ballast or LED load at 120 V, 1200-VA ballast or LED load at 277 V, and 800-W incandescent.

E. Ceiling-mounted Sensor:

1. Solid-state indoor occupancy sensors with a separate power pack.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 20 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:
  - a. Sensor: Suitable for mounting in any position on a standard octagon box.
  - b. Relay: Externally mounted through a 1/2 inch (13 mm) knockout in a standard electrical enclosure.
  - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.

F. Ceiling-mounted Sensor with Wall-Mounted Dimmer:

1. Solid-state indoor occupancy sensors with a separate power pack.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 30 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:
  - a. Sensor: Suitable for mounting in any position on a standard octagon box.
  - b. Relay: Externally mounted through a 1/2 inch (13 mm) knockout in a standard electrical enclosure.
  - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
  - d. Power Pack: Suitable for mounting in any position on a standard octagon box.
6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Connections: RJ-45 communications outlet with cable between the power pack and Dimmer.
9. Dimmer: Zero-10 volt wall switch. The device shall fit in a standard single gang switch box. Device allows the user to increase or decrease the lighting level via 0-10 Vdc output. Device shall be compatible with drives and controller. DIP switch settings enable a variety of control options.

2.6 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: 0.035 inch (1 mm) thick, satin-finished 304 stainless steel.
3. Material for Exterior Wet Locations: Spring-loaded lift cover, and listed and labeled for service use in "wet locations."

2.7 POKE-THROUGH ASSEMBLIES

- A. Description: Factory-fabricated and -wired assembly of below-floor junction box with two separate compartments for power and communications, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.
- B. Construction: low profile all metal die-cast aluminum cover assemblies with sliding doors.
- C. Standards: Comply with scrub water exclusion requirements in UL 514.

- D. Service-Outlet Assembly: Flush type with one duplex receptacle and space for two RJ-45 jacks.
- E. Size: Selected to fit nominal 4-inch (100-mm) cored holes in floor and matched to floor thickness.
- F. Fire Rating: Unit is listed and labeled for fire rating of 2-hour floor assembly.
- G. Wiring Raceways and Compartments: For a minimum of one ¾" conduit for power that is pre-wired to junction box and one 1-1/2" conduit stub for data.

**2.8 FINISHES**

- A. Color:
  - 1. Wiring Devices: Gray, unless otherwise indicated.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install devices and assemblies level, plumb, and square with building lines.
- B. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- C. Remove wall plates and protect devices and assemblies during painting.

**3.2 IDENTIFICATION**

- A. Comply with Division 26 Section "Identification for Electrical Systems."
  - 1. Receptacles: Identify panelboard and circuit number from which served.
  - 2. Light switches: Identify panelboard and circuit number from which served.
  - 3. All labels used to mark cables, faceplates, patch panels and distribution hardware shall be of the self-laminating type, and shall be machine-printed with black ink on clear background. Labels will have pressure sensitive, permanent acrylic-type adhesive. All labels will be uniform in size using the same font size on letters and numbers throughout. Label printing will be 1/8" minimum in block style.

**3.3 CONNECTIONS**

- A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors."

**3.4 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

**END OF SECTION 26 2726**



**SECTION 26 5100 - INTERIOR LIGHTING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Interior lighting fixtures with lamps and ballasts.
  - 2. Emergency lighting units.
  - 3. Exit signs.

1.3 SUBMITTALS

- A. Product Data: For each type of lighting fixture scheduled, arranged in order of fixture designation. Include data on features, accessories, and finishes.
- B. Shop Drawings: Show details of nonstandard or custom fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.
  - 1. Include wiring diagrams.
- C. Product Certificates: For each type of ballast for dimmer-controlled fixtures, signed by product manufacturer.
- D. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.
- C. FMG Compliance: Fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FMG.
- D. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

**2.2 LIGHTING FIXTURES**

- A. Fixtures shall be equal to those scheduled on the drawings.

**2.3 EXIT SIGNS**

- A. General: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
  - 1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum of rated lamp life.
- C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
  - 1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
  - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
  - 3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

**2.4 TEMPORARY LIGHTING**

- A. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

**2.5 FIXTURE SUPPORT COMPONENTS**

- A. Comply with Division 26 Section "Basic Electrical Materials and Methods" for channel and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2 inch (13 mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2 inch (13 mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated.



- E. Rod Hangers: 3/16 inch (5 mm) minimum diameter, cadmium-plated, threaded steel rod.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Independent Support for Fixtures in or on Grid-Type Suspended Ceilings:
  - 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate at each fixture corner.
  - 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application or sheet metal screws.
  - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4 inch (20 mm) metal channels spanning and secured to ceiling tees.
  - 4. Install at least one independent support rod or two (2) wires from structure to a tab on recessed down lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
  - 5. As directed by the Electrical Inspector.

**END OF SECTION 26 5100**



**SECTION 28 3111 – DIGITAL, ADDRESSABLE FIRE ALARM**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawing and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

**1.2 SUMMARY**

- A. This Section includes fire alarm systems.
- B. Definitions:
  - 1. FACP: Fire alarm control panel (existing).
  - 2. LED: Light-emitting diode.
  - 3. Definitions in NFPA 72 apply to fire alarm terms used in this Section.
- C. System Description:
  - 1. Existing, noncoded, addressable system; multiplexed signal transmission dedicated to fire alarm service only.
- D. Performance Requirements:
  - 1. See fire alarm system input/output matrix on drawings.

**1.3 SUBMITTALS**

- A. Product Data: For each type of new product device indicated to match existing fire alarm system equipment.
- B. Shop Drawings:
  - 1. Batteries: Size calculations.
  - 2. Amplifiers: Size calculations.
  - 3. Circuits: Voltage drop calculations.
- C. Field quality-control test reports.
- D. Operation and maintenance data.
- E. Documentation:
  - 1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner, Architect, and authorities having jurisdiction.
  - 2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner, Architect, and authorities having jurisdiction. Format of the written sequence of operation shall be the optional input/output matrix.

- a. Hard copies on paper to Owner, Architect, and authorities having jurisdiction.
- F. Provide computer generated riser with all components, cables, and conduit for complete operation.

**1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**1.5 SPECIAL INSTRUCTIONS**

- A. Schneider Electric is responsible for the fire alarm in this facility.
- B. Schneider Electric shall witness all programming changes to the fire alarm system.
- C. The contractor shall provide a digital copy of the fire alarm system program prior to any modifications to the programming and shall provide a digital copy of the fire alarm system program after modifications. The program shall be provided on a CD.
- D. All costs and fees associated with Schneider's involvement are the contractor's responsibility.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Existing "Edwards" FACP and Equipment:
    - a. Match existing devices similar to model number specified and compatible with existing equipment.
    - b. All equipment provided shall be UL listed to work with the existing Edwards equipment.
  - 2. Wire and Cable:
    - a. Match existing.
  - 3. Audible and Visual Signals:
    - a. Similar to existing devices.

**2.2 FACP**

**A. General Description:**

1. The fire alarm control panel is existing "Edwards" system to be maintained. Programming of system shall be performed or shall be supervised by Schneider Electric.
2. A digital and printed copy of the program will be provided to the contractor.
3. After programming is complete, installed and operating, the Contractor will provide the Owner with a digital and printed copy of the program.
4. All cost and fees associated with Schneider's involvement is the contractor's responsibility.

**B. Circuits:**

1. Signaling Line Circuits: NFPA 72, Class A, Style 6, match existing.
2. Notification-Appliance Circuits: NFPA 72, Class A, Style Z, match existing.
3. Actuation of alarm notification appliances and annunciation shall occur within 10 seconds after the activation of an initiating device.
4. Electrical monitoring for the integrity of wiring external to the FACP for mechanical equipment shutdown and magnetic door-holding circuits is not required, provided a break in the circuit will cause doors to close and mechanical equipment to shut down.

**C. Notification-Appliance Circuit: Existing to be maintained.**

**2.3 NOTIFICATION APPLIANCES**

**A. Description: Equipped for mounting as indicated and with screw terminals for system connections.**

1. Combination Devices: Factory-integrated speaker; audible and visible devices in a single-mounting assembly.
2. Similar to Edwards Model # WG4 Series.
  - a. Candela ratings as shown on drawings.
  - b. Ceiling type units as shown on drawing.
  - c. Device installation ratings shall match installation method.

**2.4 BOOSTER POWER SUPPLY (BPS)**

**A. Booster power supply:**

1. Similar to Edwards model BPS10A.

**2.5 WIRE AND CABLE**

- A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760. Match existing.
- B. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation. Match existing.

**PART 3 - EXECUTION**

**3.1 EQUIPMENT INSTALLATION**

- A. Audible/Visible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- B. All strobes shall be synchronized.
- C. Review existing battery loads and provide additional capacity for the new loads indicated with a spare capacity of 25 percent. Provide calculations with shop drawings.
- D. Review existing voice amplifier loads and provide additional capacity for the new loads indicated with a spare capacity of 25 percent. Provide calculations with shop drawings.

**3.2 WIRING INSTALLATION**

- A. Install wiring according to the following:
  - 1. NECA 1.
  - 2. TIA/EIA 568-A.
  - 3. As required by manufacturer.
- B. Wiring Method: All fire alarm wiring shall be in EMT metal raceway.
  - 1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed to match existing system.
- C. Wiring Method:
  - 1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
  - 2. Signaling Line Circuits: Power-limited fire alarm cables shall not be installed in the same cable or raceway as signaling line circuits.
- D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- F. Color and style of signal and initiating devices shall be same as devices on other floors.

**3.3 IDENTIFICATION**

- A. Identify system components, wiring, cabling, and terminals according to Division 26 Section "Identification of Electrical Systems."

**3.4 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
  2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters.
  3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
  4. Testing: Follow procedure and record results complying with requirements in NFPA 72.
  5. Detectors that are outside their marked sensitivity range shall be replaced.
  6. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

**3.5 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices. Refer to Division 01 Section "Closeout Procedures."

**END OF SECTION 28 3111**

