

Planning Architecture Interior design Graphic Design Project Management

## ADDENDUM to CONTRACT DOCUMENTS

| Project Name: | Delaware Technical & Community<br>College – "E" Wing Lab Renovations                                 |
|---------------|--|
| Copies:       | Delaware Technical & Community College<br>MacIntosh Engineering<br>Landmark/JCM<br>Furlow Associates |
| From:         | Renee Richardson, BSA + A  |
| То:           | All Bidders  |
| Date:         | July 22nd, 2014  |

Project Number: BSA+A # 11.103E

Subject:

### **ADDENDUM 1**

#### NOTICE:

Attention is called to the following item(s), effective as of the date above, which shall be added to, deleted from, or changed in the contract documents dated **January 10, 2013** and any previously issued addenda, thereby incorporating these items into the contract documents.

Attach this Addendum to the project manual for this project. Work or materials not specifically mentioned herein are to be as described in the main body of the specifications and as shown on the drawings. Bidders shall acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the bidder to disgualification.

The following clarification, changes and/or additions shall by this reference be incorporated into the contract documents as though fully set forth therein.

Buck Simpers Architect + Associates, Inc.

715 North Orange Street Wilmington, DE 19801

> 302.658.9300 fax 658.1125

www.simpers.com

#### A. GENERAL

| Item No. | Item  |
|----------|---|
| A-1      | Mechanical, Plumbing & ATC contractor to include all work associated with supply<br>and installation of Autoclave for a fully functioning system.   |
| A-2      | REVISED – The Bid Due/Opening Date and Time has been changed from 07/28/13 at 2:00 PM. The new Bid Due/Opening Date and Time is Thursday, 08/07/13 at 2:00 PM.  |
| A-3      | REVISED – Bid Period Questions must be submitted in writing to Kevin Mueller with Bancroft Construction Company at e-mail address;         kmueller@bancroftusa.com         by         5:00 PM on Sunday, 07/27/13. Answers will be provided via addenda before close of business on Wednesday, 07/28/14. |

#### **B.** MODIFICATIONS TO PROJECT MANUAL

| Item No. | Description:  |
|----------|---|
| B-1      | Revise Bid Set – Omit all previous specifications. Entire set attached for Bid use. |

#### C. BIDDER QUESTIONS & CLARIFICATIONS

| Item No. | Question/Answer  |
|----------|--|
| C-1      | Contractor's Request for Information Log<br>See attachment |

#### D. MODIFICATIONS TO DRAWINGS

| Item No. | Description:  |
|----------|---|
| D-1      | Revise Bid set – Omit all previous construction documents. Entire set attached for Bid use. |

#### E. ATTACHMENTS

| Items   | Date    |
|---|---------|
| Contractor's Request for Information Log      | 7/22/14 |
| Set of Issued for Bid: Specifications         | 7/22/14 |
| Pre Bid Meeting Agenda & Handout              | 7/22/14 |
| Pre Bid Meeting Minutes                       | 7/22/14 |
| Pre Bid Meeting Sign-in Sheet                 | 7/22/14 |
| Set of Issued for Bid: Construction Documents | 7/22/14 |

# Delaware Technical & Community College

400 Stanton-Christiana Road Newark, DE 19713

## ALLIED HEALTH E-WING LAB RENOVATION

Microbiology/Biology; Anatomy; Physiology Labs

# **PROJECT MANUAL**

BSA+A PROJECT #11.103E

## 100% CD Issued for Bid

JULY 22, 2014



# **PROJECT MANUAL**

# DELAWARE TECHNICAL & COMMUNITY COLLEGE

## Allied Health E-Wing Lab Renovation

#### ARCHITECT

BSA+A / Buck Simpers Architect + Associates, Inc. 715 N. Orange Street Wilmington, DE 19801 302.658.9300 fax 302.658.1125

#### **CONSTRUCTION MANAGER**

Bancroft Construction Company 300 Grant Avenue - Suite 110 Wilmington, DE 19806 302.254.3020 fax 302.254.3133

#### **STRUCTURAL ENGINEER**

MacIntosh Engineering 300 Delaware Avenue - Suite 820 Wilmington, DE 19801 302.252.9200 fax 302.252.9201

#### MECHANICAL/ELECTRICAL/PLUMBING ENGINEER

Furlow Associates, Inc. 1206 Society Drive Claymont, DE 19703 302.798.3515 fax 302.798.9799

#### VOLUME 1

Project Title Page Table of Contents

#### **DIVISION 0 – PROCUREMENT AND CONTRACT REQUIREMENTS**

| 001000 | Bid Advertisement   |  |  |
|--------|---|--|--|
|        | Invitation to Bid   |  |  |
|        | Instruction to Bidders  |  |  |
|        | Standard Form of Agreement (AIA document A101 – 2007)                 |  |  |
|        | Amendment to Contract   |  |  |
|        | Bid Bond Form   |  |  |
|        | Payment Bond Form   |  |  |
|        | Performance Bond Form   |  |  |
|        | Prevailing Wages  |  |  |
|        | DE Prevailing Wage Regulations  |  |  |
|        | Classification of Workers under DE Prevailing Wage Law                |  |  |
|        | Sworn Payroll Report Log  |  |  |
| 003000 | Bid Form 01 – Plumbing, Mechanical & ATC                              |  |  |
| 005000 | Site Conditions   |  |  |
| 005226 | General Conditions of the Contract for Construction (AIA A132 – 2009) |  |  |
| 006000 | Special Conditions  |  |  |
| 006216 | Insurance   |  |  |
| 007000 | General Conditions (AIA Document 201-2007, General Conditions)        |  |  |
| 007344 | Release Form for Electronic Files                                     |  |  |
|        |   |  |  |

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- 010000 General Requirements
- 010110 Summary of Work All Packages
- 011000 Summary
- 011530 Change Order Procedure
- 012000 Project Meetings
- 012300 Alternates
- 012500 Substitution Procedure
- 012501 Substitution Request Form
- 012600 Contract Modification Procedure
- 012900 Payment Procedures
- 013100 Milestone Schedule Project Master Schedule
- 013200 Construction Progress Documentation
- 013233 Photographic Documentation
- 013300 Submittal Procedures
- 013523 Safety Program
- 014000 Quality Requirements

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| 016000 | Product Requirements                       |
| 016200 | Material & Equipment                       |
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| 017419 | Construction Waste Management and Disposal |
| 017700 | Closeout Procedures                        |
| 017839 | Project Record Document                    |
| 017900 | Demonstration and Training                 |
| 019113 | General Commissioning Requirements         |

#### **DIVISION 2 – EXISTING CONDITIONS**

#### **DIVISION 05 – METALS**

051200 Structural Steel Framing

#### **DIVISION 8 - OPENINGS**

| 081113 | Hollow Metal Frames    |
|--------|------------------------|
| 001115 | TIONOW MICHAI FTAIlles |

|       | - |      |      |       |     |  |
|-------|---|------|------|-------|-----|--|
| 08141 | 6 | Flus | h Wo | od Do | ors |  |

087100 Door Hardware

#### **DIVISION 9 - FINISHES**

- 092900 Gypsum Board Assemblies
- 095113 Acoustical Panel Ceilings
- 096513 Resilient Base & Accessories
- 096519 Resilient Tile Flooring
- 096723 Resinous Flooring
- 099100 Painting

#### **DIVISION 12 – FURNISHINGS**

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- 123553 Wood Laboratory Casework

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- 220110 Drainage Systems Plumbing
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- 220130 Gas Piping Systems Plumbing
- 220140 Fixtures Plumbing
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- 220190 Testing Plumbing
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- 260110 Raceways
- 260120 Wire and Cables
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- 260135 Electrical Boxes & Fittings
- 260140 Wiring Devices
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| 260443 | Pad-Mounted Sectionalizing Switches                   |
| 260444 | Pad-Mounted Primary Load Interrupter                  |
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| 260452 | Grounding   |
| 260460 | Transformers  |
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| 260471 | Feeder Circuits                                       |
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ADVERTISEMENT FOR BIDS - Public notice is hereby given that sealed bids for the Delaware Technical Community College Stanton Campus E Wing Lab Renovation for the Plumbing, Mechanical, and ATC Bid Package will be received at the Conference Center Rm A116 of Delaware Technical Community College, Stanton Campus, 400 Stanton-Christiana Road, Newark, DE 19713 by the DTCC Department of Administrative Services, until 2:00 pm local time, on Monday, July 28, 2014 at which time they will be publicly opened, read aloud and recorded. Bidder bears the risk of late delivery. Any bids received after the stated time will be returned unopened. Work includes a 5,000 SF renovation of existing classrooms to Microbiology/Biology and Anatomy and Physiology Labs. Prevailing wage rates and certified payroll reporting are contract requirements for this project. 100% CD's will be available on Monday, June 30, 2014. Documents may be ordered at Reprographics Center, Inc., 298 Churchmans Road, New Castle DE 19720, (302) 328-5019. Documents may be downloaded at ftp://ftp.bancroftusa.com with username ewingftp1 (case does not matter), password Bancroft#1 (case matters). You must access this site through Windows Explorer, NOT Internet Explorer. Drawings and Project Manuals may be examined at the office of Bancroft Construction Company, 1300 N. Grant Avenue, Suite 110, Wilmington, DE 19808. A non-mandatory pre-bid meeting will be held in Conference Center Rm A116 of Delaware Technical Community College, Stanton Campus, 400 Stanton-Christiana Road, Newark, DE 19713 on Tuesday, July 8, 2014, at 2:00 PM, local time. Sealed bids shall be in duplicate addressed to the DTCC, Department of Administrative Services, Delaware Technical Community College, Stanton Campus, 400 Stanton-Christiana Road, Newark, DE 19713. The outer envelope should clearly indicate: "E Wing Lab Renovation, Delaware Technical Community College, Stanton Campus, Newark, Delaware." Each bid must be accompanied by a bid security equivalent to ten percent (10%) of the bid amount and all additive alternates. The successful bidder must post a performance bond and payment bond in a sum equal to 100 percent (100%) of the contract price upon execution of the contract. Minority Business Enterprises (MBE), Disadvantaged Business Enterprises (DBE), and Women-Owned Business Enterprises (WBE) will be afforded full opportunity to submit bids on this contract and will not be subject to discrimination of the basis of race, color, national origin or sex in consideration of this award. The Owner reserves the right to reject any or all bids and to waive any informalities therein. Please contact Kevin Mueller with Bancroft Construction Company at (302) 420-1551 for further information.



#### Delaware Technical & Community College Allied Health – E Wing Lab Renovation

#### **INVITATION TO BID**

Bancroft Construction Company has provided public notification that sealed bids for the above referenced contract will be received for the Plumbing, Mechanical& ATC Bid Package until 2:00 pm (EST) on Monday, July 28<sup>th</sup> at which time they will be opened publicly.

Project documents will be available on the following ftp website on Monday, June 30th: FTP Address through Windows Explorer: <u>ftp://ftp.bancroftusa.com</u> Login name is: ewingftp1 (case does not matter), Password is: Bancroft#1 (case matters).

Project Documents will be also be available by contacting: Reprographics Center, Inc., 298 New Churchmans Road, New Castle, DE 19720 Phone (302) 328-5019 or e-mail: <u>rci1@rciplot.com</u>

Project documents include: BSA+A Project Manual dated June 30<sup>th</sup>, 2014 BSA+A Project Drawings dated June 13<sup>th</sup>, 2014

Questions may be e-mailed to <u>kmueller@bancroftusa.com</u>. All questions must be submitted by 2:00 PM on Friday, July 18<sup>st</sup>, 2014. Questions received by the deadline will be answered by Tuesday, July 22nd, 2014. Upon receipt of such notice, all bidders will be furnished additional information as necessary to make bidding uniform. Bancroft Construction Company will not be responsible for any oral instructions.

Bancroft Construction Company shall not be responsible for any cost reimbursement to bidder in preparing a resultant bid.

Your quoted prices shall include any and all applicable city, county, state and federal taxes in effect as of the date of your proposal.

Bids must be received in <u>duplicate</u> at the address shown on the Bid Form, IN WRITING, in a sealed envelope, no later than **2:00 PM on Monday, July 28th, 2014.** Bid opening will be public, de-scope meetings will be scheduled following the bid openings with the apparent low bidders.

Bidders engaged in, or offering to engage in, contracting in the State of Delaware are required to be licensed in accordance with the laws of the State of Delaware.

Incomplete bids or bids not submitted in the format or, time and place as requested herein will be considered invalid. Bids received later than requested time will be returned unopened. Oral and electronically transmitted bids will not be considered.

Sealed bids shall be addressed to the DTCC, Department of Administrative Services, Delaware Technical Community College, Stanton Campus, 400 Stanton-Christiana Road, Newark, DE 19713. The outer envelope should clearly indicate: "E Wing Lab Renovation, Delaware Technical Community College, Stanton Campus, Newark, Delaware."

Each bid must be accompanied by a bid security equivalent to ten percent (10%) of the bid amount and all additive alternates. The successful bidder must post a performance bond and payment bond in a sum equal to 100 percent (100%) of the contract price upon execution of the contract. Minority Business Enterprises (MBE), Disadvantaged Business Enterprises (DBE), and Women-Owned Business Enterprises (WBE) will be afforded full opportunity to submit bids on this contract and will not be subject to discrimination of the basis of race, color, national origin or sex in consideration of this award.

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

Prevailing wage rates and certified payroll reporting are contract requirements for this project.

Drawings and Project Manuals may be examined at the office of Bancroft Construction Company, 1300 N. Grant Avenue, Suite 110, Wilmington, DE 19808.

#### **INSTRUCTIONS TO BIDDERS**

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- 1. DEFINITIONS
- 2. BIDDER'S REPRESENTATION
- 3. BIDDING DOCUMENTS
- 4. BIDDING PROCEDURES
- 5. CONSIDERATION OF BIDS
- 6. POST-BID INFORMATION
- 7. PERFORMANCE BOND AND PAYMENT BOND
- 8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

#### **ARTICLE 1: GENERAL**

- 1.1 DEFINITIONS
- 1.1.1 Whenever the following terms are used, their intent and meaning shall be interpreted as follows:
- 1.2 STATE: The State of Delaware.
- 1.3 AGENCY: Contracting State Agency as noted on cover sheet.
- 1.4 DESIGNATED OFFICIAL: The agent authorized to act for the Agency.
- 1.5 BIDDING DOCUMENTS: Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement for Bid, Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders (if any), General Conditions, Supplementary General Conditions, General Requirements, Special Provisions (if any), the Bid Form (including the Non-collusion Statement), and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, as well as the Drawings, Specifications (Project Manual) and all Addenda issued prior to execution of the Contract.
- 1.6 CONTRACT DOCUMENTS: The Contract Documents consist of the, Instructions to Bidders, Supplementary Instructions to Bidders (if any), General Conditions, Supplementary General Conditions, General Requirements, Special Provisions (if any), the form of agreement between the Owner and the Contractor, Drawings (if any), Specifications (Project Manual), and all addenda.
- 1.7 AGREEMENT: The form of the Agreement shall be AIA Document A101 2007, Standard Form of Agreement between Owner and Contractor, where the basis of payment is a Stipulated Lump Sum. In the case of conflict between the instructions contained therein and the General Requirements herein, these General Requirements shall prevail.
- 1.8 GENERAL REQUIREMENTS (or CONDITIONS): General Requirements (or conditions) are instructions pertaining to the Bidding Documents and to contracts in general. They contain, in summary, requirements of laws of the State; policies of the Agency and instructions to bidders.
- 1.9 SPECIAL PROVISIONS: Special Provisions are specific conditions or requirements peculiar to the bidding documents and to the contract under consideration and are supplemental to the General Requirements. Should the Special Provisions conflict with the General Requirements, the Special Provisions shall prevail.
- 1.10 ADDENDA: Written or graphic instruments issued by the Owner/Architect prior to the execution of the contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

- 1.11 BIDDER OR VENDOR: A person or entity who formally submits a Bid for the material or Work contemplated, acting directly or through a duly authorized representative who meets the requirements set forth in the Bidding Documents.
- 1.12 SUB-BIDDER: A person or entity who submits a Bid to a Bidder for materials or labor, or both for a portion of the Work.
- 1.13 BID: A complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.
- 1.14 BASE BID: The sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids (if any are required to be stated in the bid).
- 1.15 ALTERNATE BID (or ALTERNATE): An amount stated in the Bid, where applicable, to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents is accepted.
- 1.16 UNIT PRICE: An amount stated in the Bid, where applicable, as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.
- 1.17 SURETY: The corporate body which is bound with and for the Contract, or which is liable, and which engages to be responsible for the Contractor's payments of all debts pertaining to and for his acceptable performance of the Work for which he has contracted.
- 1.18 BIDDER'S DEPOSIT: The security designated in the Bid to be furnished by the Bidder as a guaranty of good faith to enter into a contract with the Agency if the Work to be performed or the material or equipment to be furnished is awarded to him.
- 1.19 CONTRACT: The written agreement covering the furnishing and delivery of material or work to be performed.
- 1.20 CONTRACTOR: Any individual, firm or corporation with whom a contract is made by the Agency.
- 1.21 SUBCONTRACTOR: An individual, partnership or corporation which has a direct contract with a contractor to furnish labor and materials at the job site, or to perform construction labor and furnish material in connection with such labor at the job site.
- 1.22 CONTRACT BOND: The approved form of security furnished by the contractor and his surety as a guaranty of good faith on the part of the contractor to execute the work in accordance with the terms of the contract.
- 1.23Owner:Delaware Technical & Community College<br/>400 Stanton-Christiana Road

#### Newark, DE 19713

| 1.24 | Architect:               | BSA+A / Buck Simpers Architect + Associates, Inc.<br>715 N. Orange Street<br>Wilmington, DE 19801 |
|------|--------------------------|---|
| 1.25 | Construction<br>Manager: | Bancroft Construction<br>1300 N. Grant Ave<br>Suite 110<br>Wilmington, Delaware 19806             |

#### **ARTICLE 2: BIDDER'S REPRESENTATIONS**

#### 2.1 PRE-BID MEETING

- 2.1.1 A pre-bid meeting for this project will be held at the time and place designated. Attendance at this meeting is not a pre-requisite for submitting a Bid.
- 2.2 By submitting a Bid, the Bidder represents that:
- 2.2.1 The Bidder has read and understands the Bidding Documents and that the Bid is made in accordance therewith.
- 2.2.2 The Bidder has visited the site, become familiar with existing conditions under which the Work is to be performed, and has correlated the Bidder's his personal observations with the requirements of the proposed Contract Documents.
- 2.2.3 The Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception.
- 2.3 JOINT VENTURE REQUIREMENTS
- 2.3.1 For Public Works Contracts, each Joint Venturer shall be qualified and capable to complete the Work with their own forces.
- 2.3.2 Included with the Bid submission, and as a requirement to bid, a copy of the executed Joint Venture Agreement shall be submitted and signed by all Joint Venturers involved.
- 2.3.3 All required Bid Bonds, Performance Bonds, Material and Labor Payment Bonds must be executed by both Joint Venturers and be placed in both of their names.
- 2.3.4 All required insurance certificates shall name both Joint Venturers.
- 2.3.5 Both Joint Venturers shall sign the Bid Form and shall submit a valid Delaware Business License Number with their Bid or shall state that the process of application for a Delaware Business License has been initiated.
- 2.3.6 Both Joint Venturers shall include their Federal E.I. Number with the Bid.
- 2.3.7 In the event of a mandatory Pre-bid Meeting, each Joint Venturer shall have a representative in attendance.
- 2.3.8 Due to exceptional circumstances and for good cause shown, one or more of these provisions may be waived at the discretion of the State.

#### 2.4 ASSIGNMENT OF ANTITRUST CLAIMS

2.4.1 As consideration for the award and execution by the Owner of this contract, the Contractor hereby grants, conveys, sells, assigns and transfers to the State of Delaware all of its right,

title and interests in and to all known or unknown causes of action it presently has or may now or hereafter acquire under the antitrust laws of the United States and the State of Delaware, relating to the particular goods or services purchased or acquired by the Owner pursuant to this contract.

#### **ARTICLE 3: BIDDING DOCUMENTS**

- 3.1 COPIES OF BID DOCUMENTS
- 3.1.1 Bidders may obtain complete sets of the Bidding Documents as designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein.
- 3.1.2 Bidders shall use complete sets of Bidding Documents for preparation of Bids. The issuing Agency nor the Architect assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 3.1.3 Any errors, inconsistencies or omissions discovered shall be reported to the Architect immediately.
- 3.1.4 The Agency and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.
- 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS
- 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall report any errors, inconsistencies, or ambiguities discovered to the Architect.
- 3.2.2 Bidders or Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect at least seven days prior to the date for receipt of Bids. Interpretations, corrections and changes to the Bidding Documents will be made by written Addendum. Interpretations, corrections, or changes to the Bidding Documents made in any other manner shall not be binding.
- 3.2.3 The apparent silence of the specifications as to any detail, or the apparent omission from it of detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and only material and workmanship of the first quality are to be used. Proof of specification compliance will be the responsibility of the Bidder.
- 3.2.4 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all permits, labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.

3.2.5 The Owner will bear the costs for all impact and user fees associated with the project.

#### 3.3 SUBSTITUTIONS

- 3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of quality, required function, dimension, and appearance to be met by any proposed substitution. The specification of a particular manufacturer or model number is not intended to be proprietary in any way. Substitutions of products for those named will be considered, providing that the Vendor certifies that the function, quality, and performance characteristics of the material offered is equal or superior to that specified. It shall be the Bidder's responsibility to assure that the proposed substitution will not affect the intent of the design, and to make any installation modifications required to accommodate the substitution.
- 3.3.2 Requests for substitutions shall be made in writing to the Architect at least ten days prior to the date of the Bid Opening. Such requests shall include a complete description of the proposed substitution, drawings, performance and test data, explanation of required installation modifications due the substitution, and any other information necessary for an evaluation. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval shall be final. The Architect is to notify Owner prior to any approvals.
- 3.3.3 If the Architect approves a substitution prior to the receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding.
- 3.3.4 The Architect shall have no obligation to consider any substitutions after the Contract award.

#### 3.4 ADDENDA

- 3.4.1 Addenda will be mailed or delivered to all who are known by the Architect to have received a complete set of the Bidding Documents.
- 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
- 3.4.3 No Addenda will be issued later than 4 days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which extends the time or changes the location for the opening of bids.
- 3.4.4 Each bidder shall ascertain prior to submitting his Bid that they have received all Addenda issued, and shall acknowledge their receipt in their Bid in the appropriate space. Not acknowledging an issued Addenda could be grounds for determining a bid to be non-responsive.

#### 3.5 LIQUIDATED DAMAGES: N/A

#### **ARTICLE 4: BIDDING PROCEDURES**

#### **INSTRUCTIONS TO BIDDERS**

#### 4.1 PREPARATION OF BIDS

- 4.1.1 Submit the bids on the Bid Forms included with the Bidding Documents.
- 4.1.2 Submit the original Bid Form for each bid. Bid Forms may be removed from the project manual for this purpose.
- 4.1.3 Execute all blanks on the Bid Form in a non-erasable medium (typewriter or manually in ink).
- 4.1.4 Where so indicated by the makeup on the Bid Form, express sums in both words and figures, in case of discrepancy between the two, the written amount shall govern.
- 4.1.5 Interlineations, alterations or erasures must be initialed by the signer of the Bid.
- 4.1.6 BID ALL REQUESTED ALTERNATES AND UNIT PRICES, IF ANY. If there is no change in the Base Bid for an Alternate, enter "No Change". The Contractor is responsible for verifying that they have received all addenda issued during the bidding period. Work required by Addenda shall automatically become part of the Contract.
- 4.1.7 Make no additional stipulations on the Bid Form and do not qualify the Bid in any other manner.
- 4.1.8 Each copy of the Bid shall include the legal name of the Bidder and a statement whether the Bidder is a sole proprietor, a partnership, a corporation, or any legal entity, and each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current Power of Attorney attached, certifying agent's authority to bind the Bidder.
- 4.1.9 Bidder shall complete the Non-Collusion Statement form included with the Bid Forms and include it with their Bid.
- 4.1.10 In the construction of all Public Works projects for the State of Delaware or any agency thereof, preference in employment of laborers, workers or mechanics shall be given to bona fide legal citizens of the State who have established citizenship by residence of at least 90 days in the State.

#### 4.2 BID SECURITY

4.2.1 All bids shall be accompanied by a deposit of either a good and sufficient bond to the agency for the benefit of the agency, with corporate surety authorized to do business in this State, the form of the bond and the surety to be approved by the agency, or a security of the bidder assigned to the agency, for a sum equal to at least 10% of the bid plus all add alternates, or in lieu of the bid bond a security deposit in the form of a certified check, bank treasurer's check, cashier's check, money order, or other prior approved secured deposit assigned to the State. The bid bond need not be for a specific sum, but may be stated to be for a sum equal to 10%

of the bid plus all add alternates to which it relates and not to exceed a certain stated sum, if said sum is equal to at least 10% of the bid. The Bid Bond form used shall be the standard OMB form (attached).

- 4.2.2 The Agency has the right to retain the bid security of Bidders to whom an award is being considered until either a formal contract has been executed and bonds have been furnished or the specified time has elapsed so the Bids may be withdrawn or all Bids have been rejected.
- 4.2.3 In the event of any successful Bidder refusing or neglecting to execute a formal contract and bond within 20 days of the awarding of the contract, the bid bond or security deposited by the successful bidder shall be forfeited.
- 4.3 SUBCONTRACTOR LIST
- 4.3.1 As required by <u>Delaware Code</u>, Title 29, section 6962(d)(10)b, each Bidder shall submit with their Bid a completed List of Sub-Contractors they intend to employ for this project. NAME ONLY ONE SUBCONTRACTOR FOR EACH TRADE. A Bid will be considered non-responsive unless the completed list is included. The format and categories for the list shall be provided and reviewed and confirmed at the pre-bid meeting.
- 4.3.2 Provide the Name and Address for each listed subcontractor. Addresses by City, Town or Locality, plus State, will be acceptable.
- 4.3.3 It is the responsibility of the Contractor to ensure that their Subcontractors are in compliance with the provisions of this law. Also, if a Contractor elects to list themselves as a Subcontractor for any category, they must specifically name themselves on the Bid Form and be able to document their capability to act as Subcontractor in that category in accordance with this law.
- 4.3.4 Successful Contractors who do not use Subcontractors identified on the Subcontractor List of their Bid Form shall bear a penalty to the Owner equal to 10% of their Contract Value per occurrence.
- 4.4 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS
- 4.4.1 During the performance of this contract, the contractor agrees as follows:
  - A. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex or national origin. The Contractor will take affirmative action to ensure the applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, sex or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided by the contracting agency setting forth this nondiscrimination clause.

B. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex or national origin."

#### 4.5 PREVAILING WAGE REQUIREMENT

- 4.5.1 Wage Provisions: In accordance with <u>Delaware Code</u>, Title 29, Section 6960, renovation projects whose total cost shall exceed \$15,000, and \$100,000 for new construction, the minimum wage rates for various classes of laborers and mechanics shall be as determined by the Department of Labor, Division of Industrial Affairs of the State of Delaware.
- 4.5.2 The prevailing wage shall be the wage paid to a majority of employees performing similar work as reported in the Department's annual prevailing wage survey or in the absence of a majority, the average paid to all employees reported.
- 4.5.3 The employer shall pay all mechanics and labors employed directly upon the site of work, unconditionally and not less often than once a week and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the specifications, regardless of any contractual relationship which may be alleged to exist between the employer and such laborers and mechanics.
- 4.5.4 The scale of the wages to be paid shall be posted by the employer in a prominent and easily accessible place at the site of the work.
- 4.5.5 Every contract based upon these specifications shall contain a stipulation that sworn payroll information, as required by the Department of Labor, be furnished weekly. The Department of Labor shall keep and maintain the sworn payroll information for a period of 6 months from the last day of the work week covered by the payroll. of Labor.
- 4.6 SUBMISSION OF BIDS
- 4.6.1 Enclose the Bid, the Bid Security, and any other documents required to be submitted with the Bid in a sealed opaque envelope. Address the envelope to the party receiving the Bids. Identify with the project name, project number, and the Bidder's name and address. If the Bid is sent by mail, enclose the sealed envelope in a separate mailing envelope with the notation "BID ENCLOSED" on the face thereof. The OWNER is not responsible for the opening of bids prior to bid opening date and time that are not properly marked.
- 4.6.2 Deposit Bids at the designated location prior to the time and date for receipt of bids indicated in the Advertisement for Bids. Bids received after the time and date for receipt of bids will be marked "LATE BID" and returned.
- 4.6.3 Bidder assumes full responsibility for timely delivery at location designated for receipt of bids.

- 4.6.4 Oral, telephonic or telegraphic bids are invalid and will not receive consideration.
- 4.6.5 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids, provided that they are then fully in compliance with these Instructions to Bidders.
- 4.7 MODIFICATION OR WITHDRAW OF BIDS
- 4.7.1 Prior to the closing date for receipt of Bids, a Bidder may withdraw a Bid by personal request and by showing proper identification to the Architect. A request for withdraw by letter or fax, if the Architect is notified in writing prior to receipt of fax, is acceptable. A fax directing a modification in the bid price will render the Bid informal, causing it to be ineligible for consideration of award. Telephone directives for modification of the bid price shall not be permitted and will have no bearing on the submitted proposal in any manner.
- 4.7.2 Bidders submitting Bids that are late shall be notified as soon as practicable and the bid shall be returned.
- 4.7.3 A Bid may not be modified, withdrawn or canceled by the Bidder during a thirty (30) day period following the time and date designated for the receipt and opening of Bids, and Bidder so agrees in submitting their Bid. Bids shall be binding for 30 days after the date of the Bid opening.

#### ARTICLE 5: CONSIDERATION OF BIDS

- 5.1 OPENING/REJECTION OF BIDS
- 5.1.1 Unless otherwise stated, Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids will be made available to Bidders.
- 5.1.2 The Agency shall have the right to reject any and all Bids. A Bid not accompanied by a required Bid Security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.
- 5.1.3 If the Bids are rejected, it will be done within thirty (30) calendar day of the Bid opening.

#### 5.2 COMPARISON OF BIDS

- 5.2.1 After the Bids have been opened and read, the bid prices will be compared and the result of such comparisons will be made available to the public. Comparisons of the Bids may be based on the Base Bid plus desired Alternates. The Agency shall have the right to accept Alternates in any order or combination.
- 5.2.2 The Agency reserves the right to waive technicalities, to reject any or all Bids, or any portion thereof, to advertise for new Bids, to proceed to do the Work otherwise, or to abandon the Work, if in the judgment of the Agency or its agent(s), it is in the best interest of the State.
- 5.2.3 An increase or decrease in the quantity for any item is not sufficient grounds for an increase or decrease in the Unit Price.

- 5.2.4 The prices quoted are to be those for which the material will be furnished F.O.B. Job Site and include all charges that may be imposed during the period of the Contract.
- 5.2.5 No qualifying letter or statements in or attached to the Bid, or separate discounts will be considered in determining the low Bid except as may be otherwise herein noted. Cash or separate discounts should be computed and incorporated into Unit Bid Price(s).

#### 5.3 DISQUALIFICATION OF BIDDERS

- 5.3.1 An agency shall determine that each Bidder on any Public Works Contract is responsible before awarding the Contract. Factors to be considered in determining the responsibility of a Bidder include:
  - A. The Bidder's financial, physical, personnel or other resources including Subcontracts;
  - B. The Bidder's record of performance on past public or private construction projects, including, but not limited to, defaults and/or final adjudication or admission of violations of the Prevailing Wage Laws in Delaware or any other state;
  - C. The Bidder's written safety plan;
  - D. Whether the Bidder is qualified legally to contract with the State;
  - E. Whether the Bidder supplied all necessary information concerning its responsibility; and,
  - F. Any other specific criteria for a particular procurement, which an agency may establish; provided however, that, the criteria be set forth in the Invitation to Bid and is otherwise in conformity with State and/or Federal law.
- 5.3.2 If an agency determines that a Bidder is nonresponsive and/or nonresponsible, the determination shall be in writing and set forth the basis for the determination. A copy of the determination shall be sent to the affected Bidder within five (5) working days of said determination.
- 5.3.3 In addition, any one or more of the following causes may be considered as sufficient for the disqualification of a Bidder and the rejection of their Bid or Bids.
- 5.3.3.1 More than one Bid for the same Contract from an individual, firm or corporation under the same or different names.
- 5.3.3.2 Evidence of collusion among Bidders.
- 5.3.3.3 Unsatisfactory performance record as evidenced by past experience.

- 5.3.3.4 If the Unit Prices are obviously unbalanced either in excess or below reasonable cost analysis values.
- 5.3.3.5 If there are any unauthorized additions, interlineation, conditional or alternate bids or irregularities of any kind which may tend to make the Bid incomplete, indefinite or ambiguous as to its meaning.
- 5.3.3.6 If the Bid is not accompanied by the required Bid Security and other data required by the Bidding Documents.
- 5.3.3.7 If any exceptions or qualifications of the Bid are noted on the Bid Form.
- 5.4 ACCEPTANCE OF BID AND AWARD OF CONTRACT
- 5.4.1 A formal Contract shall be executed with the successful Bidder within twenty (20) calendar days after the award of the Contract.
- 5.4.2 Per Section 6962(d)(13) a., Title 29, Delaware Code, "The contracting agency shall award any public works contract within thirty (30) days of the bid opening to the lowest responsive and responsible Bidder, unless the Agency elects to award on the basis of best value, in which case the election to award on the basis of best value shall be stated in the Invitation To Bid."
- 5.4.3 Each Bid on any Public Works Contract must be deemed responsive by the Agency to be considered for award. A responsive Bid shall conform in all material respects to the requirements and criteria set forth in the Contract Documents and specifications.
- 5.4.4 The Agency 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, plus accepted Alternates.
- 5.4.5 The successful Bidder shall execute a formal contract, submit the required Insurance Certificate, and furnish good and sufficient bonds, unless specifically waived in the General Requirements, in accordance with the General Requirement, within twenty (20) days of official notice of contract award. Bonds shall be for the benefit of the Agency with surety in the amount of 100% of the total contract award. Said Bonds shall be conditioned upon the faithful performance of the contract. Bonds shall remain in affect for period of one year after the date of substantial completion.
- 5.4.6 If the successful Bidder fails to execute the required Contract and Bond, as aforesaid, within twenty (20) calendar days after the date of official Notice of the Award of the Contract, their Bid guaranty shall immediately be taken and become the property of the State for the benefit of the Agency as liquidated damages, and not as a forfeiture or as a penalty. Award will then be made to the next lowest qualified Bidder of the Work or readvertised, as the Agency may decide.
- 5.4.7 Prior to receiving an award, the successful Bidder shall furnish to the Agency proof of State of Delaware Business Licensure. If the Bidder does not currently have a Business License, they may obtain an application by writing to: Division of Revenue, Carvel State Office

Building, 820 French Street, Wilmington, DE 19899. A copy of the letter written to the Division of Revenue, sent with your Bid will be adequate proof for your firm to be considered for award until such time as you receive your license.

5.4.8 The Bid Security shall be returned to the successful Bidder upon the execution of the formal contract. The Bid Securities of unsuccessful bidders shall be returned within thirty (30) calendar days after the opening of the Bids.

#### **ARTICLE 6: POST-BID INFORMATION**

- 6.1 CONTRACTOR'S QUALIFICATION STATEMENT
- 6.1.1 Bidders to whom award of a Contract is under consideration shall, if requested by the Agency, submit a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a statement has been previously required and submitted.
- 6.2 BUSINESS DESIGNATION FORM
- 6.2.1 Successful bidder shall be required to accurately complete an Office of Management and Budget Business Designation Form for Subcontractors.
- 6.2.2 Employing Delawareans Reporting Requirements for Awarded Contracts: All contracts awarded shall be in conformity with Section 40 of Senate Bill 130 and submit a report to the Director of the Office of Management and Budget setting forth actual number and percentage of employees of such contractors who are bona fide legal residence of the State. To the extent any subcontractors are employed in connection with any such contractor, the contractor shall further disclose the actual number and percentage of employees of such subcontractor who are bona fide legal residents of the State. Such report shall be due on the earlier of 30 days from the completion of the project or December 31 of each calendar year.

#### ARTICLE 7: PERFORMANCE BOND AND PAYMENT BOND

#### 7.1 BOND REQUIREMENTS

- 7.1.1 The cost of furnishing the required Bonds that are stipulated in the Bidding Documents, shall be included in the Bid.
- 7.1.2 If the Bidder is required by the Agency to secure a bond from other than the Bidder's usual sources, changes in cost will be adjusted as provide in the Contract Documents.
- 7.1.3 The Performance and Payment Bond forms used shall be the standard OMB forms (attached).
- 7.2 TIME OF DELIVERY AND FORM OF BONDS

- 7.2.1 The bonds shall be dated on or after the date of the Contract.
- 7.2.2 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix a certified and current copy of the power of attorney.

#### **ARTICLE 8: FORM OF AGREEMENT BETWEEN AGENCY AND CONTRACTOR**

8.1 Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101 - 2007, Standard Form of Agreement Between Owner and Contractor, where the basis of payment is a Stipulated Lump Sum.

END OF INSTRUCTIONS TO BIDDERS

## AIA<sup>®</sup> Document A101<sup>™</sup> – 2007

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

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

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

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

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

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

The Owner and Contractor agree as follows.

#### ADDITIONS AND DELETIONS:

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

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

AIA Document A201<sup>™</sup>-2007. General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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#### **ARTICLE 1 THE CONTRACT DOCUMENTS**

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

#### **ARTICLE 2 THE WORK OF THIS CONTRACT**

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

#### ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner. (Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

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

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than ( ) days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

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Portion of Work

#### Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents. (Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

#### **ARTICLE 4 CONTRACT SUM**

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

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

#### § 4.3 Unit prices, if any:

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

Item

Units and Limitations

Price Per Unit (\$ 0.00)

§ 4.4 Allowances included in the Contract Sum, if any: (Identify allowance and state exclusions, if any, from the allowance price.)

Item

Price

#### ARTICLE 5 PAYMENTS § 5.1 PROGRESS PAYMENTS

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

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

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

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported

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by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

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

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

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ( ). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201TM-2007, General Conditions of the Contract for Construction;
- Add that portion of the Contract Sum properly allocable to materials and equipment delivered and .2 suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of ();
- Subtract the aggregate of previous payments made by the Owner; and .3
- Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment .4 as provided in Section 9.5 of AIA Document A201-2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the .1 full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and (Section 9.8.5 of AIA Document A201-2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)
- Add, if final completion of the Work is thereafter materially delayed through no fault of the .2 Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201-2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

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

#### § 5.2 FINAL PAYMENT

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

- the Contractor has fully performed the Contract except for the Contractor's responsibility to correct .1 Work as provided in Section 12.2.2 of AIA Document A201-2007, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

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#### ARTICLE 6 DISPUTE RESOLUTION § 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201-2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker. (If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

#### § 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201-2007, the method of binding dispute resolution shall be as follows:

(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

- [] Arbitration pursuant to Section 15.4 of AIA Document A201-2007
- [] Litigation in a court of competent jurisdiction
- [] Other (Specify)

#### ARTICLE 7 TERMINATION OR SUSPENSION

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

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

#### ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201-2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

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

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

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

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

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

§ 8.6 Other provisions:

#### **ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS**

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

§ 9.1.1 The Agreement is this executed AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

| Document | Title | Date | Pages |
|----------|-------|------|-------|
|----------|-------|------|-------|

§ 9.1.4 The Specifications:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

| Section   | Title | Date  |       | Pages |  |  |  |  |
|---|-------|-------|-------|-------|--|--|--|--|
| § 9.1.5 The Drawings:<br>(Either list the Drawings here or refer to an exhibit attached to this Agreement.) |       |       |       |       |  |  |  |  |
| Number  |       | Title | Date  |       |  |  |  |  |
| § 9.1.6 The Addenda, if any:  |       |       |       |       |  |  |  |  |
| Number  |       | Date  | Pages |       |  |  |  |  |

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

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

AIA Document E201TM-2007, Digital Data Protocol Exhibit, if completed by the parties, or the .1 following:

Init.

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.2 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

#### ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201-2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201-2007.)

Type of insurance or bond

Limit of liability or bond amount (\$ 0.00)

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

**OWNER** (Signature)

**CONTRACTOR** (Signature)

(Printed name and title)

(Printed name and title)

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### Additions and Deletions Report for

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This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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There are no differences.

1

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### Certification of Document's Authenticity

AIA<sup>®</sup> Document D401<sup>™</sup> – 2003

I, Jane Best-Weick, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 13:30:38 on 03/01/2010 under Order No. 4263420622\_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A101TM - 2007 - Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

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1

Amendment to Contract for Construction Between Delaware Technical & Community College And

The parties hereby agree that the AIA Document A101 - 2007 "Standard Form of Agreement between Owner and Contractor" shall govern this transaction as supplemented and amended herein. The parties expressly agree that the terms of this amendment shall govern in the event of a conflict between the terms of the AIA Document or any document referenced or incorporated therein, and that any contrary provision of any such document shall be superseded hereby.

- 1. By signing this Agreement, Contractor swears that he has not employed or retained any company or person, other than a bona fide employee working primarily for the firm offering professional services, to solicit or secure this agreement, and that he has not been paid or agreed to pay any person, company, corporation, individual, or firm, other than a bona fide employee working primarily for the firm offering professional services, any fee, commission, percentage, gift, or any other consideration, contingent upon or resulting from the award or making of this agreement;
- 2. All provisions of the Bid Package and Project manual are incorporated herein by reference as though fully set forth. In the event of a conflict between any provision of the Bid Package or Project Manual and the bid or proposal submitted by Contractor, the Bid Package and Project Manual shall control.
- 3. Section 3.3 is amended to require substantial completion of all construction not later than \_\_\_\_\_ days from the commencement of construction. Time is of the essence. If the Contractor fails to complete the work within the time specified, the Contractor shall pay liquidated damages to the Owner in the amount of \$\_\_\_\_\_ for each calendar day of delay until the work is completed or accepted. If the Owner terminates the Contractor's right to proceed, liquidated damages are in addition to all sums and remedies available to Owner upon termination for cause.
- 4. In the event the attached contract or aggregate of contracts is in excess of \$100,000 for new construction (including painting and decorating) or \$15,000 for alteration, repair, renovation, rehabilitation, demolition or reconstruction (including painting and decorating of buildings or works) and requires or involves the employment of mechanics and/or laborers, then the minimum wages to be paid to the various classes of laborers and mechanics shall be based upon greater of the Davis-Bacon Wage Rates or the wages that will be determined by the Delaware Department of Labor, Division of Industrial Affairs, to be prevailing in the county in which the work is to be performed.

- 5. Contractor shall pay all mechanics and laborers employed directly upon the site of the work, unconditionally and not less often than once a week and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than the prevailing wages, regardless of any contractual relationship which may be alleged to exist between the employer and such laborers and mechanics, and shall provide sworn payroll information, as required by the Department of Labor, on a weekly basis.
- 6. All changes to the scope of construction shall be authorized in writing by Owner in advance. Owner shall not be liable for payment of any change order that has not received prior written authorization. The cost of any change order shall be set forth therein. If no such provision is set forth in the change order, then the cost to the Owner shall be the Contractor's costs for wages, labor costs other than wages, wage taxes, materiel, equipment rentals, insurance and subcontracts attributable to the additional activity plus a reasonable sum for overhead and profit not to exceed 5%;
- 7. Preference in employment of laborers, workers or mechanics shall be given to bona fide legal citizens of the State who have established citizenship by residence of at least 90 days in the State. Contractor shall pay a penalty to the Secretary of Finance equal to the amount of compensation paid to any person in violation of this section;
- 8. Contractor shall not substitute another subcontractor for any subcontractor whose name was set forth in the statement which accompanied the bid without the written consent of Owner. Contractor shall pay a penalty equal to 150% of the amount of the proposal or subcontract submitted by the subcontractor identified in the accompanying statement for violating this paragraph.
- 9. Payments are due 30 days after receipt of a valid Application for Payment. Payments due and unpaid after 30 days shall bear interest of one percent per month not to exceed twelve percent per annum;
- 10. Final payment shall not be due until all non-conforming work has been corrected and all other provisions of the agreement have been met, including, but not limited to, all reporting requirements. Furthermore, a written release of mechanics' liens signed by all persons who would otherwise be entitled to avail themselves of the provisions of Chapter 27 of Tile 25 of the Delaware Code, containing a notarized, verified certification signed by the Contractor that all of the persons signing the release constitute all of the persons who have furnished materials and performed labor in and for the construction, erection, building, improvement, alteration and repair to the date of the release and who would be entitled otherwise to file mechanics' liens claims shall be provided simultaneously with the receipt of final payment;
- 11. Owner may terminate this agreement or suspend work hereunder for any reason authorized by applicable Delaware law;

- 12. §6.2 is hereby deleted. The parties reserve all remedies available at law or equity for any dispute not resolved in accordance with §6.1. In the event legal action is instituted to enforce performance hereunder, the prevailing party shall be entitled to an award of attorneys fees and costs in addition to all other relief granted;
- 13. Simultaneous with the execution of the this contract, Contractor shall also execute a good and sufficient bond for the benefit of Owner, with corporate surety authorized to do business in this State, in a sum equal to 100% of the contract price and the bond form used shall be the standard form issued by the Office of Management and Budget;
- 14. The bond shall be conditioned upon the faithful compliance and performance by the successful bidder of each and every term and condition of the contract and the proposal and plans and specifications thereof, at the time and in the manner prescribed by the contract and the plans and specifications, including the payment in full, to every firm furnishing materiel or performing labor in the performance of the contract, of all sums of money due it for such labor or materiel. The bond shall also contain the Contractor's guarantee to indemnify and save harmless the Owner from all costs, damages and expenses growing out of or by reason of Contractor's failure to comply and perform the work and complete the contract in accordance with its terms. No firm or surety, in any action brought under 29 <u>Del C</u> §6962, or any successor law, or on the bond required by such statute, shall assert as a defense to such action the claim that the bond given contained a limitation or restriction not provided for by Chapter 69, Title 29 of the Delaware Code, the provisions of which are incorporated herein by reference as though fully set forth;
- 15. Owner shall have the right to terminate the contract upon receipt of notice from Contractor's surety that bond claims have been made or are anticipated to be made against Contractor on this or any other project of Contractor. If Owner elects to terminate the contract pursuant to this paragraph, it shall be deemed a termination for cause.
- 16. Owner may, when it considers that its interests so require, cause judgment to be confessed upon the bond. All sums received through confession of judgment shall be paid for the credit of the Owner to the Secretary of Finance;
- 17. Owner or any of its duly authorized representatives shall have access to any documents, books, papers, and records of Contractor (which are directly pertinent to a specific grant program) for the purpose of making an audit, examination, excerpts, and transcriptions. Contractor shall maintain all required records for at least three years after Owner makes final payment and all pending matters are closed;
- 18. Contractor shall submit a report to Owner not less frequently than monthly covering the general progress of the job and describing any problems or factors contributing to delay;

19. During the performance of this contract, the contractor agrees as follows:

The contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex, sexual orientation or national origin. The contractor will take positive steps to ensure that applicants are employed and that employees are treated during employment without regard to their race, creed, color, sex, sexual orientation or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided by the contracting agency setting forth this nondiscrimination clause.

The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, sexual orientation or national origin.

- 20. The parties agree that this agreement shall be governed by and construed pursuant to the laws of The State of Delaware, and that the Delaware courts shall have sole and exclusive jurisdiction of any dispute arising under this agreement.
- 21. This contract is subject to the Employing Delawareans Reporting Requirements set for in Section 40 of the FY11 Bond Bill (SB 130). In accordance therewith, Contractor shall submit a report to the Director of the Office of Management and Budget, with a copy to Owner, setting forth (a) the actual number of Contractor's employees employed on the project; (b) the number and percentage of such employees who are bona fide legal residents of the State; (c) the total number of employees of the Contractor; and (d) the total percentage of employees of such Contractor who are bona fide residents of the State. To the extent subcontractors are employed in connection with the project, Contractor shall further disclose the actual numbers and percentages of employees of such subcontractor who are bona fide legal residents of the State as set forth above. Such report shall be due on the earlier of 30 days from the completion of the project or December 31 of each calendar year. For purposes of this section, "bona fide legal resident of this State" shall mean any resident who has established residence of at least 90 days in the State.

IN WITNESS WHEREOF, the parties have set their hand and seal on this indenture on this \_\_\_\_\_ day of \_\_\_\_\_\_, 2012.

Delaware Technical & Community College

\_\_\_\_(Seal)

Orlando J. George, Jr, President

(Contractor)

\_\_\_\_\_(Seal)

By:

#### STATE OF DELAWARE OFFICE OF MANAGEMENT AND BUDGET

#### BID BOND

# TO ACCOMPANY PROPOSAL (Not necessary if security is used)

and State of \_\_\_\_\_\_as Surety, legally authorized to do business in the State of Delaware well and truly to be made, we do bind ourselves, our and each of our heirs, executors, administrators, and successors, jointly and severally for and in the whole firmly by these presents. NOW THE CONDITION OF THIS OBLIGATION IS SUCH That if the above bonded Principal who has submitted to the \_\_\_\_\_\_ (*insert State agency name*) a certain proposal to enter into this contract for the furnishing of certain material and/or services within the State, shall be awarded this Contract, and if said Principal shall well and truly enter into and execute this Contract as may be required by the terms of this Contract and approved by the \_\_\_\_\_ (*insert State agency name*) this Contract to be entered into within twenty days after the date of official notice of the award thereof in accordance with the terms of said proposal, then this obligation shall be void or else to be and remain in full force and virtue. Sealed with \_\_\_\_\_\_ seal and dated this \_\_\_\_\_\_ day of \_\_\_\_\_\_ in the year of our Lord two thousand and \_\_\_\_\_\_ (20\_\_\_\_). SEALED, AND DELIVERED IN THE Presence of Name of Bidder (Organization) Corporate By: Seal Authorized Signature Attest Title Name of Surety Witness:\_\_\_\_\_ By:

#### STATE OF DELAWARE OFFICE OF MANAGEMENT AND BUDGET

#### PAYMENT BOND

Bond Number:

| KNOW ALL PERSONS BY THESE              | E PRESENTS, that we      | e,, as principal                                 |
|--|--------------------------|--|
| (" <b>Principal</b> "), and            | , a                      | corporation, legally                             |
| authorized to do business in the State | of Delaware, as suret    | y (" <b>Surety</b> "), are held and firmly bound |
| unto the                               |                          | ("Owner") (insert State agency                   |
| name), in the amount of                | (\$                      | ), to be paid to <b>Owner</b> , for which        |
| payment well and truly to be made,     | we do bind ourselves     | s, our and each and every of our heirs,          |
| executors, administrations, successors | s and assigns, jointly a | nd severally, for and in the whole firmly        |
| by these presents.                     |                          |  |

Sealed with our seals and dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if **Principal**, who has been awarded by **Owner** that certain contract known as Contract No. \_\_\_\_\_\_dated the \_\_\_\_\_\_dated the \_\_\_\_\_\_dated truly of \_\_\_\_\_\_, 20\_\_ (the "Contract"), which Contract is incorporated herein by reference, shall well and truly pay all and every person furnishing materials or performing labor or service in and about the performance of the work under the Contract, all and every sums of money due him, her, them or any of them, for all such materials, labor and service for which **Principal** is liable, shall make good and reimburse **Owner** sufficient funds to pay such costs in the completion of the Contract as **Owner** may sustain by reason of any failure or default on the part of **Principal**, and shall also indemnify and save harmless **Owner** from all costs, damages and expenses arising out of or by reason of the performance of the Contract and for as long as provided by the Contract; then this obligation shall be void, otherwise to be and remain in full force and effect.

**Surety**, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of **Surety** and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition or change in or to the Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any work to be performed or any monies due or to become due thereunder; and **Surety** hereby waives notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to **Surety** as though done or omitted to be done by or in relation to **Principal**.

**Surety** hereby stipulates and agrees that no modifications, omission or additions in or to the terms of the Contract shall in any way whatsoever affect the obligation of **Surety** and its bond.

Any proceeding, legal or equitable, under this Bond may be brought in any court of competent jurisdiction in the State of Delaware. Notices to **Surety** or Contractor may be mailed or delivered to them at their respective addresses shown below.

IN WITNESS WHEREOF, **Principal** and **Surety** have hereunto set their hand and seals, and such of them as are corporations have caused their corporate seal to be hereto affixed and these presents to be signed by their duly authorized officers, the day and year first above written.

|                             | PRINCIPAL |        |
|-----------------------------|-----------|--------|
|                             | Name:     |        |
| Witness or Attest: Address: |           |        |
|                             | By:       | (SEAL) |
| Name:                       | Name:     |        |
| (Corporate Seal)            | Title:    |        |
|                             | SURETY    |        |
|                             | Name:     |        |
| Witness or Attest: Address: |           |        |
|                             | By:       | (SEAL) |
| Name:                       | Name:     |        |
| (Corporate Seal)            | Title:    |        |

-2-

#### STATE OF DELAWARE OFFICE OF MANAGEMENT AND BUDGET

#### **PERFORMANCE BOND**

Bond Number: \_\_\_\_\_

| KNOW ALL PERSONS BY THESE              | PRESENTS, that we, _    | , as principal                            |
|--|-------------------------|---|
| ("Principal"), and                     | , a                     | corporation, legally                      |
| authorized to do business in the State | of Delaware, as surety  | " ("Surety"), are held and firmly bound   |
| unto the                               |                         | ("Owner") (insert State agency            |
| name), in the amount of                | (\$                     | ), to be paid to <b>Owner</b> , for which |
| payment well and truly to be made,     | we do bind ourselves,   | , our and each and every of our heirs,    |
| executors, administrations, successor  | rs and assigns, jointly | and severally, for and in the whole,      |
| firmly by these presents.              |                         |   |

Sealed with our seals and dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if **Principal**, who has been awarded by **Owner** that certain contract known as Contract No. \_\_\_\_\_\_ dated the \_\_\_\_\_\_ day of \_\_\_\_\_\_, 20\_\_ (the "Contract"), which Contract is incorporated herein by reference, shall well and truly provide and furnish all materials, appliances and tools and perform all the work required under and pursuant to the terms and conditions of the Contract and the Contract Documents (as defined in the Contract) or any changes or modifications thereto made as therein provided, shall make good and reimburse **Owner** sufficient funds to pay the costs of completing the Contract that **Owner** may sustain by reason of any failure or default on the part of **Principal**, and shall also indemnify and save harmless **Owner** from all costs, damages and expenses arising out of or by reason of the performance of the Contract and for as long as provided by the Contract; then this obligation shall be void, otherwise to be and remain in full force and effect.

**Surety**, for value received, hereby stipulates and agrees, if requested to do so by **Owner**, to fully perform and complete the work to be performed under the Contract pursuant to the terms, conditions and covenants thereof, if for any cause **Principal** fails or neglects to so fully perform and complete such work.

**Surety**, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of **Surety** and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition or change in or to the Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any work to be performed or any monies due or to become due thereunder; and **Surety** hereby waives notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other

transferees shall have the same effect as to **Surety** as though done or omitted to be done by or in relation to **Principal**.

**Surety** hereby stipulates and agrees that no modifications, omissions or additions in or to the terms of the Contract shall in any way whatsoever affect the obligation of **Surety** and its bond.

Any proceeding, legal or equitable, under this Bond may be brought in any court of competent jurisdiction in the State of Delaware. Notices to **Surety** or Contractor may be mailed or delivered to them at their respective addresses shown below.

IN WITNESS WHEREOF, **Principal** and **Surety** have hereunto set their hand and seals, and such of them as are corporations have caused their corporate seal to be hereto affixed and these presents to be signed by their duly authorized officers, the day and year first above written.

|                             | PRINCIPAL       |        |
|-----------------------------|-----------------|--------|
|                             | Name:           |        |
| Witness or Attest: Address: |                 |        |
|                             | By:             | (SEAL) |
| Name:                       | Name:<br>Title: | 、      |
| (Corporate Seal)            |                 |        |
|                             | SURETY          |        |
|                             | Name:           |        |
| Witness or Attest: Address: |                 |        |
|                             | By:             | (SEAL) |
| Name:                       | Name:           | 、 、    |
| (Corporate Seal)            | Title:          |        |

#### STATE OF DELAWARE DEPARTMENT OF LABOR DIVISION OF INDUSTRIAL AFFAIRS OFFICE OF LABOR LAW ENFORCEMENT PHONE: (302) 451-3423

Mailing Address: 225 CORPORATE BOULEVARD SUITE 104 NEWARK, DE 19702

#### Located at: 225 CORPORATE BOULEVARD SUITE 104 NEWARK, DE 19702

PREVAILING WAGES FOR BUILDING CONSTRUCTION EFFECTIVE MARCH 14, 2014

| CLASSIFICATION                    | NEW CASTLE | KENT  | SUSSEX |
|-----------------------------------|------------|-------|--------|
| ASBESTOS WORKERS                  | 21.87      | 26.94 | 39.20  |
| BOILERMAKERS                      | 65.47      | 33.22 | 48.83  |
| BRICKLAYERS                       | 48.08      | 48.08 | 48.08  |
| CARPENTERS                        | 50.91      | 50.91 | 40.47  |
| CEMENT FINISHERS                  | 31.52      | 29.11 | 21.20  |
| ELECTRICAL LINE WORKERS           | 43.49      | 37.29 | 28.44  |
| ELECTRICIANS                      | 62.10      | 62.10 | 62.10  |
| ELEVATOR CONSTRUCTORS             | 77.78      | 40,93 | 30.55  |
| GLAZIERS                          | 65.60      | 65.60 | 20.15  |
| INSULATORS                        | 51.48      | 51.48 | 51.48  |
| IRON WORKERS                      | 59.62      | 59.62 | 59.62  |
| LABORERS                          | 39.75      | 39.75 | 39.75  |
| MILLWRIGHTS                       | 63.53      | 63.53 | 50.10  |
| PAINTERS                          | 44.94      | 44.94 | 44.94  |
| PILEDRIVERS                       | 69.32      | 37.64 | 30.45  |
| PLASTERERS                        | 21.60      | 28.55 | 17.50  |
| PLUMBERS/PIPEFITTERS/STEAMFITTERS | 60.20      | 45.65 | 47.28  |
| POWER EQUIPMENT OPERATORS         | 58.31      | 58.31 | 24.13  |
| ROOFERS-COMPOSITION               | 22.35      | 19.07 | 17.63  |
| ROOFERS-SHINGLE/SLATE/TILE        | 17.59      | 17.50 | 16.45  |
| SHEET METAL WORKERS               | 63.24      | 63.24 | 63.24  |
| SOFT FLOOR LAYERS                 | 47.12      | 47.12 | 47.12  |
| SPRINKLER FITTERS                 | 52.73      | 52.73 | 52.73  |
| TERRAZZO/MARBLE/TILE FNRS         | 52.50      | 52,50 | 45.45  |
| TERRAZZO/MARBLE/TILE STRS         | 60.28      | 60.28 | 52.63  |
| TRUCK DRIVERS                     | 27,90      | 25/09 | 20.03  |

CERTIFIED:

BY: ADMINIS TAP LAW ENFORCEMENT RATOR . <del>T</del>TO

NOTE: THESE RATES ARE PROMULGATED AND ENFORCED PURSUANT TO THE PREVAILING WAGE REGULATIONS ADOPTED BY THE DEPARTMENT OF LABOR ON APRIL 3, 1992.

CLASSIFICATIONS OF WORKERS ARE DETERMINED BY THE DEPARTMENT OF LABOR, FOR ASSISTANCE IN CLASSIFYING WORKERS, OR FOR A COPY OF THE REGULATIONS OR CLASSIFICATIONS, PHONE (302) 451-3423.

NON-REGISTERED APPRENTICES MUST BE FAID THE MECHANIC'S RATE.

PROJECT: DTCC Stanton Campus-Allied Health-E Wing Renovation, New Castle County

PAGE 02/03

DEPT OF LABOR IA

00/53/5014 12:15 305-368-6604

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## DELAWARE

## PREVAILING WAGE

## REGULATIONS



STATE OF DELAWARE DEPARTMENT OF LABOR OFFICE OF LABOR LAW ENFORCEMENT 225 PENCADER BLVD., STE. 104 NEWARK, DE 19702 (302) 451-3423

> Adopted: April 3, 1992 Amended: July 1, 1993 Amended: September 15,1993 Amended: December 28,1994 Amended: October 15, 1995 Amended: January 9, 1998 Amended: December 12, 2000 Amended: July 11, 2001 Amended: October 13, 2003

Last Edited: February 2, 2009

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#### **REGULATIONS PREVAILING WAGES**

Pursuant to 29 Del.C. §8503(7), the Department of Labor, State of Delaware, hereby promulgates the following rules and regulations to implement the provisions of 29 Del.C. §6960, "Wage provisions in public construction contracts." These regulations supersede Regulations PW101, entitled "Regulations Concerning Apprentices and Supportive Service Program Trainees Employed on State Projects" (adopted April 11, 1978 and repealed April 5, 1992) and "Delaware Prevailing Wage Regulations" (adopted April 5, 1992 as amended September 15, 1993).

#### I. INTRODUCTION

The prevailing wage law states that the specifications for every contract or aggregate of contracts relating to a public works project in excess of \$100,000 for new construction (including painting and decorating) or \$15,000 for alteration, repair, renovation, rehabilitation, demolition or reconstruction (including painting and decorating of building or works) to which this State or any subdivision thereof is a party and for which the State appropriated any part of the funds and which requires or involves the employment of mechanics and/or laborers shall contain a provision stating the minimum wages to be paid various classes of laborers and mechanics which shall be based upon the wages that will be determined by the Delaware Department of Labor, Division of Industrial Affairs, to be prevailing in the county in which the work is to be performed.

#### II. ADMINISTRATION

The prevailing wage law assigns to the Department of Labor the responsibility for predetermining wage rates prevailing for the corresponding classes of laborers and mechanics employed on projects similar to the contract work in the counties where the work is to be performed. The Secretary of Labor has delegated the prescribed functions of the Department to the Administrator of the Office of Labor Law Enforcement of the Division of Industrial Affairs. The Office of Labor Law Enforcement has responsibility for enforcing and determining the prevailing rates, and ensuring that prevailing wages are paid in accordance with the provisions of the law.

Enforcement responsibility includes the conducting of investigations regarding compliance with the law; settling, adjusting and adjudicating, by informal means, cases involving the payment of prevailing wages; coordinating the enforcement activities of the various State agencies having contract compliance and enforcement responsibilities; requiring the withholding of payments to employers who have failed to pay prevailing wages; and recommending the commencement of legal proceedings against those failing to comply with the law.

#### **III. CONCEPTS AND DEFINITIONS**

This section presents definitions and explanations to provide a basic understanding of elements inherent in collecting wage data and issuing wage determinations, and enforcing prevailing rates.

- A. Activity Covered. 29 Del.C. §6960 applies to every contract or aggregate of contracts relating to a public works project in excess of \$100,000 for new construction (including painting or decorating) or \$15,000 for alteration, repair, renovation, rehabilitation, demolition or reconstruction (including painting and decorating of building or works) to which this State or any subdivision thereof is a party and for which the State appropriated any part of the funds and which requires or involves the employment of mechanics and/or laborers.
- B. "Building" or "Work". The terms "building" or "work" generally include construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work. The terms include without limitation, buildings, structures, and improvements of all types, such as bridges, dams, plants, highways, parkways, streets, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, buoys, jetties, breakwaters, levees, canals, dredging, shoring, rehabilitation and reactivation of plants, scaffolding, drilling, blasting, excavating, clearing, and landscaping. The manufacture or furnishing of materials, articles, supplies or equipment is not a "building" or "work" within the meaning of the regulations unless conducted at the site of such a building or work.
- C. Laborers and Mechanics. The terms "laborer" and "mechanic" include at least those workers whose duties are manual or physical in nature (including those workers who use tools or who are performing the work of a trade), as distinguished from mental or managerial. The term "laborer" or "mechanic" includes apprentices and Supportive Service Program (SSP) trainees. The term does not apply to workers whose duties are primarily administrative, executive, or clerical, rather than manual. Persons employed in a bona fide executive, administrative, or professional capacity are not deemed to be laborers or mechanics. Working foremen who devote more than twenty (20) percent of their time during a workweek to mechanic or laborer duties are deemed to be laborers and mechanics for the time so spent.

The terms "laborers" and "mechanics" do not apply to watchmen, guards, dispatchers, or weighmasters. The following classifications of workers are recognized by the Department:

Asbestos Workers Boilermakers Bricklayers Carpenters Cement Finishers Electrical Line Worker Electricians Elevator Constructors Glaziers Insulators Iron Workers Laborers Millwrights Painters Pile Driver Plasterers Plumbers/Pipefitters/Steamfitters Power Equipment Operators Roofers – Composition Roofers – Shingle, Slate and Tile Sheet Metal Workers Soft Floor Layers Soft Floor Layers Sprinkler Fitters Terrazzo/Marble/Tile Setters Terrazzo/Marble/Tile Finishers Truck Drivers

Definitions for each classification are contained in a separate document entitled "Classifications of Workers Under Delaware's Prevailing Wage Law." Workers shall be classified by the Department of Labor with the advice of the Prevailing Wage Advisory Council members. Classification determinations shall be recorded by the Department as they are made and shall be published annually.

Laborers and mechanics are to be paid the appropriate wage rates for the classification of work actually performed, without regard to skill.

#### D. Apprentices and Supportive Service Program Trainees.

- 1. **Definitions.** As used in this section:
  - a. The term **"apprentice"** means persons who are indentured and employed in a bona fide apprenticeship program and individually registered by the program sponsor with the Delaware Department of Labor.
  - b. The term **"apprenticeship agreement"** means a written agreement between an apprentice
  - c. and either his/her employer or a joint apprenticeship committee which contains the terms and conditions of the employment and training of the apprentice.
  - d. The term **''apprenticeship program''** means a complete plan of terms and conditions for the employment and training of apprentices.
  - e. The term **''joint apprenticeship committee''** means a local committee equally representative of employers and employees which has been established by a group of employers with a bona fide bargaining agent or agents to direct the training of apprentices with whom it has made agreements.
  - f. The term "**SSP Trainee**" or "**trainee**" means a participant in the "Supportive Service Program" mandated by the Federal Highway Administration for federally aided state highway projects.
  - g. The term **''registration''** means the approval by the Department of Labor of an apprenticeship program or agreement as meeting the basic standards adopted by the Bureau of Apprenticeship and Training, United States Department of Labor. The term "registration" for SSP Trainees means the individual registration of a participant in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

#### 2. Employment of Apprentices and SSP Trainees on State Projects.

a. Apprentices and SSP Trainees will be permitted to work as such on State contracts in excess of \$100,000 for new construction or \$15,000 for alteration, repair, renovation, rehabilitation, demolition or reconstruction only when they are registered with the Department of Labor or an approved SSP Training

Program. **b.** The mechanic's rate on all such State contracts is that rate determined by the Department of Labor. The percentage of the mechanic's rate that the registered apprentice or SSP Trainee receives will be the percentage that the apprentice or trainee qualifies for under the terms of the individual's formal Apprenticeship/Trainee agreement.

- b. Any person employed at an apprentice or trainee wage rate who is not registered as above, shall be paid the wage rate determined by the Department of Labor for the classification of work (s)he actually performed.
- c. The ratio of apprentices to mechanics on the site of any work covered by 29 Del.C. §6960 in any craft classification may not be greater than the ratio permitted to the contractor for the entire workforce under the registered apprenticeship program. Any apprentice performing work on the job site in excess of the ratio permitted under the registered program must be paid not less than the wage rate that the applicable wage determination specifies for the work (s)he actually performs.
- d. Entitlement to mechanic's wages shall be based upon seniority in the apprenticeship program or (in the case of equal seniority) seniority on the job site.

#### 3. Records.

- a. Every employer who employs an apprentice or SSP trainee under this part must keep the records required by Title 19, Delaware Code, Chapters 9 and 11, including designation of apprentices or trainees on the payroll. In addition, every employer who employs apprentices or SSP trainees shall preserve the agreements under which the individuals were employed.
- b. Every joint apprenticeship committee or SSP Program sponsor shall keep a record of the cumulative amount of work experience gained by the apprentice or trainee.
- c. Every joint apprenticeship committee shall keep a list of the employers to whom the apprentice was assigned and the period of time (s)he worked for each. Every SSP Program sponsor shall keep a list of the projects to which the trainee was assigned and the period of time (s)he worked on each.
- d. The records required by paragraphs (a), (b), and (c) of this section shall be maintained and preserved for at least three (3) years from the termination of the apprenticeship or training period. Such records shall be kept safe and accessible at the place or places of employment or at a central location where such records are customarily maintained. All records shall be available at any time for inspection and copying by the Department of Labor.
- E. Working Foremen. 29 Del.C. §6960 does not apply to (and therefore survey data are not collected for) workers whose duties are primarily administrative, executive or clerical, rather than manual. However, working foremen who devote more than twenty (20) percent of their time during a workweek to mechanic or laborer duties are laborers and mechanics for the time so spent and data will be collected for the hours spent as laborers or mechanics.
- F. **Helpers**. Helper classifications are not recognized by the Department of Labor. All laborers and mechanics are to be paid the appropriate wage rate for the classification of work actually performed, without regard to skill.
- G. **Construction Projects**. In the wage determination process, the term "project" refers to construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work away from the site of the work and consists of all construction necessary to complete a facility regardless of the number of contracts involved so long as all contracts awarded are closely related in the purpose, time and

place. For example, demolition or site clearing work preparatory to construction is considered a part of the project.

- 1. **Character Similar**. 29 Del.C. §6960 requires the predetermination of wage rates which are prevailing on projects of a "character similar to the construction work." As a general rule, the Department identifies projects by end use type and classifies them into three major categories:
  - a. Building Construction. Building construction generally is the construction of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment, or supplies. It includes all construction of such structures, the installation of utilities and the installation of equipment, both above and below grade level as well as incidental grading, utilities and paving. Additionally, such structures need not be "habitable" to be building construction. The installation of heavy machinery and/or equipment shall not change the project's character as a building. Examples: Alterations and additions to nonresidential buildings; Apartment buildings (5 stories and above); Arenas (enclosed); Auditoriums; Automobile parking garages; Banks and financial buildings; Barracks; Churches; Hospitals; Hotels; Industrial buildings; Institutional buildings; Libraries; Mausoleums; Motels; Museums; Nursing and convalescent facilities; Office buildings; Outpatient clinics; Passenger and freight terminal buildings; Police stations; Post offices; City halls; Civic centers; Commercial buildings; Court houses; Detention facilities; Dormitories; Farm buildings; Fire stations; Power plants; Prefabricated buildings; Remodeling buildings; Renovating buildings; Repairing buildings; Restaurants; Schools; Service stations; Shopping centers; Stores; Subway stations; Theaters; Warehouses; Water and sewage treatment plants (building only).
  - b. Heavy Construction. Heavy projects are those that are not properly classified as either "building" or "highway". Unlike these classifications, heavy construction is not a homogeneous classification. Examples of Heavy construction: Antenna towers; Bridges (major bridges designed for commercial navigation); Breakwaters; Caissons (other than building or highway); Canals; Channels; Channel cut-offs; Chemical complexes or facilities (other than buildings); Cofferdams; Coke ovens; Dams; Demolition (not incidental to construction); Dikes; Docks; Drainage projects; Dredging projects; Electrification projects (outdoor); Flood control projects; Industrial incinerators (other than building); Irrigation projects; Jetties; Kilns; Land drainage (not incidental to other construction); Land leveling (not incidental to other construction); Land reclamation; Levees; Locks, Waterways; Oil refineries; Pipe lines; Ponds; Pumping stations (pre-fabricated drop-in units); Railroad construction; Reservoirs; Revetments; Sewage collection and disposal lines; Sewers (sanitary, storm, etc.); Shoreline maintenance; Ski tows; Storage tanks; Swimming pools (outdoor); Subways (other than buildings); Tipples; Tunnels; Unsheltered piers and wharves; Viaducts (other than highway); Water mains; Waterway construction; Water supply lines (not incidental to building); Water and sewage treatment plants (other than buildings); Wells.
  - c. **Highway Construction**. Highway projects include the construction, alteration or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, parking areas, greenway projects and other similar projects not incidental to building or heavy construction. Examples: Alleys; Base courses; Bituminous treatments; Bridle paths; Concrete pavement; Curbs; Excavation and

embankment (for road construction); Fencing (highway); Grade crossing elimination (overpasses or underpasses); Parking lots; Parkways; Resurfacing streets and highways; Roadbeds; Roadways; Shoulders; Stabilizing courses; Storm sewers incidental to road construction; Street Paving; Guard rails on highway; Highway signs; Highway bridges (overpasses; underpasses; grade separation); Medians; Surface courses; Taxiways; Trails.

- d. **Multiple Categories**. In some cases a project includes construction items that in themselves encompass different categories of construction. Generally, a project is considered mixed and a "multiple schedule" used if the construction items are substantial in relation to project cost, i.e. more than twenty (20) percent. Only one schedule is used if construction items are "incidental" in function to the overall character of a project (e.g., paving of parking lots or an access road on a building project), and if there is not a substantial amount of construction in the second category.
- 2. Site of Work. A basic characteristic of the construction industry is the continual shift in the site of employment. 29 Del.C. §6960 provides that prevailing wages are to be paid to "...all mechanics and laborers employed directly upon the site of the work ..." (emphasis added). The site of the work is limited to the physical place or places where the construction called for in the contract will remain when work on it has been completed.
- H. **Prevailing Wage Rates.** Every contract and the specifications for every contract to which section 6960 applies are required to contain a provision stating the minimum wages to be paid various classes of laborers and mechanics. These rates are to be based upon the wages that the Department of Labor determines to be prevailing for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the county in which the work is to be performed, as reported in the Department's annual prevailing wage survey. The prevailing wage shall be the wage paid to a majority of employees performing similar work as reported in the Department's annual prevailing wage survey or, in the absence of a majority, the weighted average wage paid to all employees reported.
- I. **Wages.** The term "wages" means the basic hourly rate of pay plus fringe benefits as defined below.
- J. **Fringe Benefits**. Fringe benefits may be considered in determining whether an employer has met his/her prevailing wage obligations. As a general rule, any fringe benefit may be considered as long as the employer is not legally required to provide it. Therefore, benefits such as health, welfare or retirement benefits, vacation, holiday pay or sick leave pay could be considered fringe benefits. Employer payments for unemployment insurance, workers' compensation, FICA, etc. (which are required by law) would not be considered fringe benefits.

In order to be considered a valid fringe benefit, payments must be made either in cash, or contributed to an irrevocable escrow account at least once each month. "Irrevocable" means that the benefit may not be forfeited. However, a benefit plan can be considered by the Department provided that payments to the plan are made irrevocably by the employer, even though certain employees may forfeit their individual rights to the benefits under certain prescribed conditions. Thus, if payments are made by the employer, and no return of those payments is possible, the plan would be acceptable, even though individual employees might not receive the benefits under certain situations. Benefits forfeited by such employees remain in an escrow account for the use of the other employees.

The actual cost of the benefit to the employer is the basis for evaluating the value of the fringe benefit. Administration costs are not considered fringe benefits. The cost of the benefits must be apportioned between employment on both public and private projects. Thus, the total value of the benefit would be divided by the total amount of time worked. This will result in benefit per unit of time which would be equally applicable to public and private employment projects. Example: an employee works two weeks (80 hours) on a public project and two weeks (80 hours) on a private project. The employer pays \$160 for the employee's health insurance for the month. The value of the benefit is \$1.00 per hour. The employer is not permitted to apply the entire premium to the public project alone.

- K. **Peak Week**. In determining prevailing wages, the Department utilizes a "peak week" survey concept to ensure that wage and fringe benefit data obtained from employers reflects for each classification, the payroll period during which the greatest number of workers in each classification is used on a project. The survey solicits the number of employees and wages paid at each given rate during the peak week. The contractor or reporting organization selects the week (between July 1 to December 31 of the previous year) during which the greatest number of each classification of laborers and mechanics was working. Peak weeks may be different for each classification of worker.
- L. **Wage Determinations**. A "wage determination" is the listing of wages (including fringe benefits) for each classification of laborers and mechanics, which the Administrator has determined to be prevailing in a given county and type of construction. Wage determinations are issued annually.
- M. Maintenance Work. To "maintain" means to preserve or keep in an existing state or condition to prevent a decline, lapse, or cessation from that state or condition. Wages paid to workers performing maintenance work shall not be used in determining prevailing wage rates.
- N. Area. The term "area" in determining wage rates under 29 Del.C. §6960 shall mean the county of the State in which the work is to be performed. The term "area" in determining classifications of workers under 29 Del.C. §6960 shall mean the State of Delaware.
- O. Secretary. "Secretary" means the Secretary of Labor for the State of Delaware.
- P. Administrator. "Administrator" means the Administrator of the Office of Labor Law Enforcement for the Delaware Department of Labor, Division of Industrial Affairs.
- Q. Department. "Department" means the Delaware Department of Labor.

#### IV. DETERMINING PREVAILING WAGES

The Department of Labor shall conduct an annual survey for obtaining and compiling wage rate information and shall encourage the voluntary submission of wage data by contractors, contractors' associations, labor organizations, public officials and other interested parties, reflecting wage rates paid to laborers and mechanics on various types of construction in the area.

A. **Scope of Task**. State directed and assisted construction activity is not restricted to any geographic sector of the state or to any particular type of construction. As a result, data collection methods employed by the Department for gathering prevailing wage information must be capable of determining patterns of wage compensation, including fringe benefits, for virtually all classifications of construction workers in at least the three major types of construction, within each of the three counties in Delaware. And,

since the objective is determining "prevailing" wages, the collection of data must be completed within a relatively brief time frame.

- B. **Data to be Collected.** Operation of the prevailing wage program necessitates an annual effort by the Department to obtain, compile and analyze wage rate information. This section explores the nature of the data and the means of collection.
  - 1. What Information. Wage rates are issued for each classification of laborer and mechanic that will likely be employed in State funded or assisted construction in a certain type of construction. Information on wages paid, therefore, must be collected and tabulated on the basis of distinct job classifications and construction categories. The survey reporting form used by the Department to collect wage and fringe information, "Report of Construction Wage Rates", provides for reporting data which includes the contractor's name and address, telephone number, project description and location, the highest number of workers employed in each classification during the peak week of the survey period (which shall be within the period July 1 to December 31 of the year preceding the request for data) and the wage rate, including bona fide fringe benefits, paid to each worker.
    - 2. Geographic Scope. A prime objective of the prevailing wage law is to protect local rates of pay and 29 Del.C. §6960 stipulates that the "area" for the determination of wage rates is to be the county in which the work is performed.

### V. THE SURVEY

The purpose of prevailing wage surveys is to collect information on wage and fringe benefit rates paid to mechanics and laborers working on construction projects of a similar character in a predetermined geographic area and calendar period. The Department attempts to give each contractor equal opportunity to be included in the final data base from which the prevailing rates are derived. The Department shall conduct the survey in accordance with the following steps:

#### A. Plan the Survey.

The Department shall begin the survey preparation process no later than November of each year. Forms will be printed and supplies (envelopes, postage, etc.) will be ordered in preparation for the survey mailing. The Department will request from the Division of Unemployment Insurance a computer printout (with two sets of address labels) of the names and addresses of all employers in the following Standard Industrial Classification (SIC) Codes, who reported workers during the calendar year in which the request is made:

- 1522 Residential Buildings, Other Than Single-Family [The Department will specify that buildings under five stories should not be reported]
- 1541 Industrial Buildings and Warehouses
- 1542 Nonresidential Buildings, Other Than Industrial Buildings and Warehouses
- 1611 Highway and Street Construction, Except Elevated Highways
- 1622 Bridge, Tunnel, and Elevated Highway Construction
- 1623 Water, Sewer, Pipeline, and Communications and Power Line Construction
- 1629 Heavy Construction, Not Elsewhere Classified
- 1711 Plumbing, Heating and Air Conditioning
- 1721 Painting and Paper Hanging
- 1731 Electrical Work

- 1741 Masonry, Stone Setting, and Other Stone Work
- 1742 Plastering, Drywall, Acoustical, and Insulation Work
- 1743 Terrazzo, Tile, Marble, and Mosaic Work
- 1751 Carpentry Work
- 1752 Floor Laying and Other Floor Work, Not Elsewhere Classified
- 1761 Roofing, Siding, and Sheet Metal Work
- 1771 Concrete Work
- 1781 Water Well Drilling
- 1791 Structural Steel Erection
- 1793 Glass and Glazing Work
- 1794 Excavation Work
- 1795 Wrecking and Demolition Work
- 1796 Installation or Erection of Building Equipment, Not Elsewhere Classified
- 1799 Special Trade Contractors, Not Elsewhere Classified

The Department will begin to assemble the survey packets in mid-December of each year in preparation for the early January mailing.

#### **B.** Conduct the Survey.

On or before January 7th of each year, survey forms will be mailed to every employer identified by the Division of Unemployment Insurance as having employed workers in the SIC Codes listed above during the calendar year preceding the collection of data. Completed survey forms must be received by the Department or postmarked no later than February 8 of the survey year in order to be used in determining prevailing rates for that year. All other forms not complying with this deadline shall not be included. In the event that February 8th falls on a Saturday, Sunday, or legal holiday, the deadline for submitting survey forms shall be the next Department business day following the February 8th deadline.

By January 10th of each year, the Department shall notify the Delaware Contractor's Association, the Building Trades Council of Delaware, the Associated Builders and Contractors, the Delaware State AFL-CIO, the Secretary of the Department of Administrative Services, the Secretary of the Department of Transportation and the Roofing Contractors Association that the annual survey is being conducted. The notification shall contain a copy of the list of employers to whom survey forms were mailed and shall invite the addressees to submit the names and addresses of any employers whose names do not appear on the list. The notification shall also contain blank survey forms for the organizations' use.

#### C. Conduct Follow-Up.

On or before February 1st of each year, the Department shall mail a second notice to all employers who failed to respond to the first request for data. A second copy of the Department's master mailing list (indicating the employers who responded) shall be sent to the organizations listed in the preceding paragraph so that they can encourage the voluntary participation of their members.

#### **D.** Clarify and Analyze Data.

The data clarification process is to begin immediately upon receipt of survey responses. Each survey response is reviewed to determine completeness, appropriateness, and accuracy of data.

#### E. Code and Record Data.

Survey responses are to be coded as follows:

- "A" Survey response is usable (i.e., it is timely, complete, appropriate, and accurate)
- "B" Employer reports no employees during survey period
- "C" Survey response is incomplete
- "D" Survey response is not applicable
- "E" Survey request not deliverable at address used/Respondent not identified on survey form/Information is not usable

Data from usable responses are to be recorded weekly in a summary ledger which contains a breakdown of each classification of worker for each type of construction for each county. Survey responses coded "A" shall be filed by county and type of construction. Survey responses coded "B", "D", and "E" shall be kept in files separate from the usable responses.

Respondents who submit code "C" survey responses (incomplete) shall be contacted by telephone by the Department. The Department will give the respondent an opportunity to supply the missing information. Failure to submit the missing information prior to the publication of the Prevailing Wage Determination (see Regulation VI.C.) will result in a disqualification of the survey response (to the extent that it is not usable).

The master mailing list shall be coded weekly to show the identity of survey participants as well as the number and types of responses.

All survey responses and documents are to be retained by the Department for a period of three years.

#### F. Determine Adequacy of Data.

At the conclusion of the survey period, the Department will review the survey ledger to determine the adequacy of data in each classification in each type of construction in each county. Data will be considered adequate if the worker classification contains the wages of ten or more employees. Classification data not meeting the above criteria will be added to the previous year's survey data for the same classification. If the data still do not reflect the wages paid to at least ten workers, the data will be considered inadequate.

#### G. Compute Prevailing Wage Rates.

The Department will enter usable data (from the summary ledgers) in the computer. If a majority (i.e., more than 50% of the workers reported in a particular category are paid at the same rate, that rate shall be the prevailing wage rate for the classification. For example:

Laborers / New Castle County / Building Construction

| Workers     | Rate of Pay | [including benefits] |
|-------------|-------------|----------------------|
| 50@         | \$17.25     | = Majority           |
| 39@         | \$16.75     |                      |
| <u>10 @</u> | \$17.55     |                      |
| 99          |             |                      |

The prevailing wage rate = \$17.25

In the absence of a majority, the computer will determine the average (mean) of the wages paid, weighted by the numbers of workers paid at each rate. For example:

Laborers/New Castle County/Building Construction

| Rate of Pay | [including benefits]      |
|-------------|---------------------------|
| \$15.50     | = \$387.50                |
| 17.25       | = 431.25                  |
| 16.75       | = 653.25                  |
| 17.55       | = 175.50                  |
|             | \$1,647.50                |
|             | \$15.50<br>17.25<br>16.75 |

 $1,647.50 \div 99$  workers = 16.64 prevailing rate

# H. Determine Wage Rates for Classes of Workers For Which Inadequate Data Are Received.

The Department is required by law to determine wages to be paid to all classes of workers employed on public projects. For that reason, the Department must have a means by which it can determine rates for which no data or inadequate data were received. If no data are received for a given classification, or if inadequate data are received (i.e., fewer than 10 workers reported in a given classification), the previous year's prevailing rates shall be reissued.

#### VI. ISSUING WAGE DETERMINATIONS.

- **A. Publication of Preliminary Determination**: On or before February 15th of each year, the Department shall publish a "Preliminary Determination of Prevailing Wage Rates." In the event that February 15th falls on a Saturday, Sunday, or legal holiday, the Department shall issue the preliminary results on the next Department business day following February 15th.
- **B. Appeals**: From February 15th to February 25th, the Administrator of the Office of Labor Law Enforcement will consider protests and inquiries relating to the preliminary results. An interested person seeking review or reconsideration of a wage determination must present a request in writing accompanied by a statement with any supporting data or other pertinent information.

Requests for reconsideration must be substantive and specific in order to be considered by the Department. For example: A request stating that, "the highway rates don't look right", would not be considered substantive or specific. However, a request stating that, "residential rates appear to have been erroneously included for carpenters in New Castle County Building Construction" would be considered substantive and specific.

From February 25th to March 1st, the Department will attempt to gather information necessary to resolve objections and requests for reconsideration. However, no appeals, objections, or requests will be considered if received by the Department after the February 25th deadline. The Department will respond in writing to all interested persons who submit a written request for review.

An appeal from the Administrator's decision must be made in writing and received by the Secretary of Labor within five calendar days from the date of the postmark on the Administrator's decision. The Secretary or his/her designee shall render a final decision in writing.

**C. Issuance of Determination:** On or before March 15th of each year, the Department shall publish its annual "Prevailing Wage Determination." The Determination shall be valid for a period of one year or until subsequent rates or amendments are issued by the Department.

Public agencies (covered by the provisions of 29 Del.C. §6960) are required to use the rates which are in effect on the date of the publication of specifications for a given project. "Date of publication" means the date on which the specifications are made available to interested persons (as specified in the published bid notice). In the event that a contract is not executed within one hundred and twenty (120) days from the earliest date the specifications were published, the rates in effect at the time of the execution of the contract shall be the applicable rates for the project.

**D.** Post Determination Actions: Wage determinations will be modified only for the purpose of correcting errors. Determinations will not be modified to include survey data received after the close of the survey period.

#### 1. Amendment to Correct Errors of Inadvertence

Amendments may be issued to correct inadvertent errors in the written text of a wage determination. The sole purpose is to correct wage schedules so that the wage determination will accurately and fully reflect the actual rates prevailing in the locality at the time the wage determination was issued. Such amendments (which may be issued at any time) are used to correct errors due to transposition of rates and other clerical mistakes made in processing the schedule; they are not used to correct errors in judgment. Contracts which have already been awarded will not be affected by such amendments. Amendments issued more than ten (10) days prior to a bid opening must be used. Amendments issued less than ten (10) days prior to a bid opening may be disregarded.

#### 2. Amendment to Correct Errors in Survey Data

Amendments which affect the validity of a wage determination may be issued to correct errors in rates resulting from erroneous information submitted by survey participants.

When the Department of Labor is notified in writing that a survey participant has submitted erroneous data (with regard to wages, fringe benefits, characterization of project, classification of workers, or county in which the work was performed), the Department shall determine the validity of the data. Corrections, if warranted, shall be made in the form of amended determinations at the end of each calendar quarter (beginning with the date the wage determination was issued). Contracts which have already been awarded will not be affected by such amendments. Amendments issued more than ten (10) days prior to a bid opening must be used. Amendments issued less than ten days prior to a bid opening may be disregarded.

#### 3. Incorrect Wage Determinations: Before Contract Award

If notification is received from the Department of Labor any time prior to the contract award that the bid documents contain the wrong wage schedule, such schedule or wage determination shall no longer be valid and may not be used - without regard to whether the bid opening has occurred. If the bid documents contain no wage schedule, it is the contractor's (or subcontractor's) responsibility to contact the Department of Labor for the correct wage schedule. Such requests must be in writing. Responses to such requests will be in writing. Any contractor or subcontractor found using an incorrect wage schedule will be required to pay the correct wages based upon the proper classification of work as determined by the Department of Labor.

#### 4. Lack of Valid Wage Determination: After Contract Award

If a contract is awarded without a wage determination or awarded with an incorrect wage determination, the contractor is responsible for the payment of the appropriate prevailing wage rates as determined by the Department of Labor.

#### 5. Additional Classifications

Any class of laborers or mechanics which is not listed in the applicable wage determination but which is to be employed under the contract is to be classified by the Department of Labor in accordance with the procedures set forth in Part III, Section C, of these regulations.

- 6. **Determination of Wages for Classifications for Which No Rates Are Published** Whenever a public project requires the services of a laborer or mechanic for which no rate has been published, the Department shall be notified in writing and shall determine the worker classification (from among the 26 classifications recognized by the Department of Labor) and the rate to be paid. The rate shall be determined as follows:
  - a. baseline rate in each county, the Department of Labor will determine the relationship between the "Building Construction" rates and the rates of the type of construction for which the rate is sought. To determine the relationship, (which is to be expressed as a percentage), the Department will use only those rates which were determined by data received in the relevant survey.
  - b. The Department will compare only those classifications for which corresponding rates were determined.
  - c. The total of the corresponding rates will be determined for each type of construction. The Heavy or Highway total will be divided by the Building rate to find what percentage of the Heavy or Highway rate to the Building rate.
  - d. The Department of Labor will multiply the Building rate for the requested classification of worker by the percentage determined in "c" to establish the applicable prevailing wage rate.

#### Hypothetical example:

A plumber's rate is needed for a New Castle County Highway project. The Department of Labor has not published a rate for this classification. The Department of Labor will determine the relationship between New Castle County Highway rates and Building rates, comparing only corresponding rates which were actually determined by the relevant survey (rates carried forward from previous years due to lack of sufficient data are not to be used).

| Ň                       | I.C.C. Building | N.C.C. Highway |
|-------------------------|-----------------|----------------|
| Bricklayers             | \$ 19.65        | \$ 12.29       |
| Carpenters              | \$ 23.37        | \$ 21.69       |
| Cement Finishers        | \$ 23.55        | \$ 15.52       |
| Laborers                | \$ 13.62        | \$ 10.60       |
| Power Equipment Operato | or \$ 22.94     | \$ 15.77       |

| Truck Drivers | <u>\$ 15.15</u> | <u>\$13.75</u> |
|---------------|-----------------|----------------|
|               | \$118.28        | \$ 89.62       |

 $89.62 \div 118.28 = 75.77\%$ 

The plumber's rate for New Castle County Building is 26.54. 26.54 x 75.77% = 20.11

The plumber's rate for New Castle County Highway = \$20.11

The same method can be used between the corresponding types of construction when the Building Construction rates do not contain a rate for the requested classification of worker; i.e., Heavy Construction rates in Sussex County can be compared with Heavy Construction rates in New Castle.

#### VII. ENFORCEMENT

The authority to enforce the prevailing wage rates derives from 29 Del.C. §6960(b) which states: "The Department of Labor shall investigate all claims that the prevailing wage rates as provided for under this section are not being or have not been paid."

#### A. DUTIES OF CONTRACTORS.

Every contractor and subcontractor on a public project shall:

- 1. Post in a prominent and accessible place at the site of the work, a legible copy of the applicable prevailing wage determination issued by the Department. The notice must remain posted during the life of the contract and must be supplemented in its entirety whenever amended wage rate determinations are issued by the Department.
- 2. Pay all mechanics and laborers employed directly upon the site of the work, unconditionally and not less often than once a week and without subsequent deduction or rebate on any account, the full amounts accrued at the time of payment, computed at wage rates not less than those stated in the prevailing wage rate determination.
  - a. Laborers or mechanics performing work in more than one occupation shall be compensated at least the rate specified for each occupation for the time actually worked therein.
  - b. An employer shall not pay or permit any worker to accept wages less than the prevailing rate of wages as determined by the Department;
  - c. Every employer performing work on a public project shall furnish weekly payroll reports to the Department of Labor on forms provided (upon request) by the Department. Payroll reports shall be mailed or delivered by the employer to the Department within one week from the last work day covered by the report. Failure to complete each and every section of the report (including the requirement that the form be notarized) will constitute a failure to submit sworn payroll information as required by the Department.
  - d. An employer shall not, at any time during the project, pay less than the prevailing rate of wages for each hour worked, regardless of the rate of pay being paid at any other time.
  - e. An employer shall not pay less than the prevailing rate of wages by docking pay, docking time, or deducting pay for any purpose unless provided for by law including the Wage Payment and Collection Act of the State of Delaware (19 Del.C. §1107).
  - f. A person shall not, either for himself/herself or any other person, request, demand, or receive, either before or after an employee is engaged, that such employee pay back, return, donate, contribute, or give any part or all of said employee's wages, salary, or thing of value, to any person, upon the statement, representation, or understanding that failure to comply with such request or demand will prevent

such employee from procuring or retaining employment. This paragraph does not apply to any agent or representative of a duly constituted labor organization acting in the collection of dues or assessments of such organization as permitted by law.

- g. A person shall not, directly or indirectly, aid, request, or authorize any person to sign a release for any claim of wages with the intent to avoid payment of the prevailing wage rates.
- 3. Keep the following records for a period of three years:
  - a. The name and address of each employee;
  - b. The social security number of each employee;
  - c. daily log for each individual employed upon the site of construction. The log must list (in general terms) the tasks performed by each employee and the amount of time spent performing each task. (examples, "hung drywall", "wired lighting fixtures", etc.);
  - d. Each employee's basic hourly rate of pay (If an employee performs public project work in more than one trade, the employer's record must reflect the hourly rate paid for each type of work performed; If an employee performs both prevailing wage work and non-prevailing wage work, the records must reflect the rates paid for each.)
  - e. The number of hours worked in each occupation on the project in the applicable pay schedule, the number of hours worked in each day, and the total number of hours worked each week;
  - f. The amount of wages paid each employee;
  - g. The amount of wages paid each employee as fringe benefit payments;
  - h. The amount of any deductions withheld from each employee's wages; and
  - i. An accurate description of the nature of the deductions withheld from each employee's wages. (Fringe benefit deductions must be supported by a written fringe benefit policy as required by the Wage Payment and Collection Act.)

#### **B. INVESTIGATION**

A complaint may be filed with the Department by any employee upon a public project or any interested party. The complaint shall be in writing. Upon receipt of a complaint or upon its own motion the Department shall initiate an investigation.

- 1. The Department shall notify the employer that a complaint has been filed and/or that an investigation has been initiated. The Department may request (or subpoena, if necessary) records, documents, or testimony necessary to make a determination as to the validity of the complaint or the employer's compliance with the law.
- 2. Upon finding that an employer has not paid or is not paying the correct prevailing wage rates, the Department of Labor shall notify the employer of the violations by certified mail and make an effort to obtain compliance.
- 3. Upon failure to obtain compliance within fifteen (15) days of receipt of said certified mail, the Department may direct the contracting agency and/or the prime contractor to withhold payments to the employer (in an amount equal to the prevailing wage deficiencies, as determined by the Department) which are to be remitted to the Department for distribution upon resolution of the matter. In addition, the Secretary may terminate all rights of the employer to proceed with the work under the contract and the employer shall be responsible for all damages resulting therefrom.
- 4. If the dispute between the Department and the employer pertains to the classification of workers as determined by the Office of Labor Law Enforcement, the determination shall be reviewable by the Secretary or his/her designee and shall be reversed only upon a finding of abuse of discretion. Such appeals from the Office of Labor Law

Enforcement's decision must be made in writing and must be received by the Secretary within fifteen (15) days from receipt of the Department's certified letter.

### C. HEARINGS

A hearing shall be held only in cases involving the termination of rights to proceed with the work under the public construction contract.

#### **D. HEARING PRACTICES AND PROCEDURES**

#### 1. SCOPE OF RULES

These rules shall govern the conduct of hearings initiated by the Department of Labor pursuant to 29 Del.C. §6960(d) to terminate all rights of the contractor or subcontractor to proceed with work under a public construction contract for failure to pay prevailing wage rates.

### 2. INITIATION OF HEARING

The Secretary of Labor may initiate a hearing by notifying the contractor or subcontractor by registered mail that said contractor or subcontractor is alleged to have violated 29 Del.C. §6960. The notice shall give 20 days prior notice to all parties as follows:

- a. The notice shall describe the subject matter of the proceedings;
- b. The notice shall give the date, time and place the hearing will be held;
- c. The notice shall cite the law or regulation giving the Department authority to act;
- d. The notice shall inform the party of his/her right to present evidence, to be represented by counsel, and to appear personally or by other representative; and
- e. The notice shall inform the parties that the Department will reach its decision based upon the evidence received.

#### 3. CONDUCT OF HEARING

- a. The hearing may be conducted by the Secretary of Labor or by a hearing officer designated for that purpose by the Secretary.
- b. In connection with such hearing, the Secretary or hearing officer may:
  - 1. Issue subpoenas for witnesses and other sources of evidence, either on the Department's initiative or at the request of any party;
  - 2. Administer oaths to witnesses;
  - 3. Exclude plainly irrelevant, immaterial, insubstantial, cumulative and privileged evidence;
  - 4. Limit unduly repetitive proof, rebuttal and cross-examination;
  - 5. Hold prehearing conferences for the settlement or simplification of issues by consent, for the disposal of procedural requests or disputes and to regulate and to expedite the course of the hearing.
- c. The conduct of hearing shall not be bound by technical rules of evidence pursuant to 19 Del.C. §105(8).
- d. The burden of proof shall be upon the Department. (If the records maintained by the employer do not provide sufficient information to determine the exact amount of wages owed, the Department may make a determination based on available evidence.)
- e. A record from which a verbatim transcript can be prepared shall be made of all hearings in contested cases. Transcripts shall be made at the request and expense of the requesting party.

#### 4. PROPOSED ORDERS

a. Whenever a hearing officer presides over a hearing (s)he shall prepare a proposed order for the consideration of the Secretary which shall include:

- 1. A brief summary of the evidence and recommended findings of fact based upon the evidence;
- 2. Recommended conclusions of law; and
- 3. Recommended decision.
- b. When the proposed order is submitted to the Secretary, a copy shall be delivered to each of the other parties who shall have 10 days to submit in writing to the Secretary exceptions, comments and arguments respecting the proposed order.

#### 5. RECORD

With respect to each case, all notices, correspondences between the agencies and the parties, all exhibits, documents in testimony admitted into evidence and all recommended orders, summary of evidence and findings of all interlocutory and final orders of the agency shall be included in the agency's record of the case and shall be retained by the agency for three (3) years.

#### 6. DECISION; FINAL ORDER

- a. The Secretary shall make his/her decision based upon the entire record of the case and upon summaries and recommendations of the hearing officer.
- b. Every case decision of the Secretary shall be incorporated in a final order which shall include, where appropriate:
  - 1. A brief summary of the evidence;
  - 2. Findings of fact based upon the evidence;
  - 3. Conclusions of law;
  - 4. Any other conclusion required by the law or the Department of Labor;
  - 5. A concise statement of the Department of Labor's determination or action on the case.
- c. Every final order shall be authenticated by the signature of the Secretary.
- d. Every final order shall immediately be mailed or delivered to each party, to the contracting agency, and each other person requesting it.
- e. Every final order may be amended or modified by the same procedure used for the initial adoption of the order.

#### 7. INFORMAL DISPOSITION

Informal disposition may be made of any matter set for hearing by stipulation, agreed settlement, consent order, or default.

#### VIII. SUBSEQUENT MODIFICATION OF REGULATIONS

The Secretary may, upon his/her own motion or upon the written request of any interested person setting forth reasonable grounds therefore, revoke or modify these regulations, after an opportunity has been given to interested persons to present their views on proposed changes. These regulations shall take effect in accordance with the requirements of the Administrative Procedures Act which is found at 29 Del. C. Chapter 101.

SO ORDERED, this 13th day of October, 2003.

Harold E. Stafford Secretary of Labor These Regulations were originally adopted April 3, 1992 and became effective on May 4, 1992.

Amended: July 1, 1993 Amended: September 15, 1993 Amended: December 28, 1994 Amended: October 15, 1995 Amended: January 9, 1998 Amended: December 12, 2000 Amended: June 14, 2001 Amended: October 13, 2003

## CLASSIFICATION OF WORKERS

## UNDER

## DELAWARE'S

## PREVAILING WAGE LAW



#### STATE OF DELAWARE DEPARTMENT OF LABOR OFFICE OF LABOR LAW ENFORCEMENT 225 CORPORATE BLVD., STE 104 NEWARK, DE 19702 (302) 451-3423

Adopted: April 3, 1992 Amended: July 1, 1993 Amended: September 15, 1993 Amended: December 28, 1994 Amended: August 15, 1996 Amended: September 15, 1997 Amended: July 10, 1998 Amended: June 24, 1999 Amended: July 11, 2001 Amended: October 30, 2003

Last Edited: February 2, 2009

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#### ASBESTOS WORKER

Removes asbestos from ceilings, walls, beams, boilers, and other structures, following hazardous waste handling guidelines: Removes asbestos pipes. Assembles scaffolding and seals off work area, using plastic sheeting and duct tape. Positions mobile decontamination unit or portable showers at entrance of work area. Builds connecting walkway between mobile unit or portable showers and work area, using handtools, lumber, nails, plastic sheeting, and duct tape. Positions portable air evacuation and filtration system inside work area. Sprays chemical solution over asbestos covered surfaces, using tank with attached hose and nozzle, to soften asbestos. Cuts and scrapes asbestos from surfaces, using knife and scraper. Shovels asbestos into plastic disposal bags and seals bags, using duct tape. Cleans work area of loose asbestos, using vacuum, broom, and dust pan. Places asbestos in disposal bags and seals bags, using duct tape. Dismantles scaffolding and temporary walkway, using handtools, and places plastic sheeting and disposal bags into transport bags. Seals bags, using duct tape, and loads bags into truck.

Applies asbestos, aluminum, pulpwood fiber, plastic panels, brick veneer, or porcelainized metal siding to building exteriors to provide decorative or insulating surfaces: Attaches tar paper, building paper, or other material to building surface, using nails or adhesive cement to provide insulating base. Fastens wood or metal laths to surface, using screws or nails. Fits and fastens siding material to laths, using rule, measuring tape, handtools, power tools, nails, screws, or bolts. Cuts and trims material to shape when fitting siding around windows or corners, using knife, shears, or portable power saw. Waterproofs surface by filling joints or cracks with caulking compound, using putty knife, trowel, or caulking gun. May apply precut siding or may cut material to size and shape at work site. May attach siding to surface of building, using adhesive cement. May attach siding by interlocking pieces through tabs provided at edges, following sequence indicated by numbers printed on reverse of each piece.

#### **BOILERMAKER**

Assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks, and vats in field, following blueprints and using handtools and portable power tools and equipment: Locates and marks reference points for columns or plates on foundation, using master straightedge, squares, transit, and measuring tape, and applying knowledge of geometry. Attaches rigging or signals crane operator to lift parts to specified position. Aligns structures or plate sections to assemble boiler frame, tanks, or vats, using plumb bobs, levels, wedges, dogs, or turnbuckles. Hammers, flame- cuts, files, or grinds irregular edges of sections or structural parts to facilitate fitting edges together. Bolts or arc-welds structures and sections together. Positions drums and headers into supports and bolts or welds supports to frame. Aligns water tubes and connects and expands ends to drums and headers, using tube expander. Bells, beads with power hammer, or welds tube ends to ensure leak proof joints. Bolts or welds casing sections, uptakes, stacks, baffles, and such fabricated parts as chutes, air heaters, fan stands, feeding tube, catwalks, ladders, coal hoppers and safety hatch to frame, using wrench. Installs manholes, handholes, valves, gauges, and feedwater connection in drums to complete assembly of water tube boilers. Assists in testing assembled vessels by pumping water or gas under specified pressure into vessel and observing instruments for evidence of leakage. Repairs boilers or tanks in field by unbolting or flame cutting defective sections or tubes, straightening plates, using torch or jacks, installing new tubes, fitting and welding new

sections and replacing worn lugs on bolts. May rivet and caulk sections of vessels, using pneumatic riveting and caulking hammers. May line firebox with refractory brick and asbestos rope and blocks. May fabricate such parts as stacks, uptakes, and chutes to adapt boiler to premises in which it is installed.

Assembles boilers, tanks, vats, and pressure vessels according to blueprint specifications, using power tools and handtools: Reads blueprint to determine location and relationship of parts. Connects firetubes to heads or watertubes to drums and headers of boilers, by expanding and belling ends, using tube expander and beading ends, using power hammer. Drills and taps holes for installation of studs, using portable drill. Tightens bolts to assemble frames, using hand or power wrenches. Mounts casings of watertube boilers, or attaches davit heads, burners, or furnace casing to firetube boilers, using wrenches. Bolts or screws accessories, such as manholes, handholes, fans, gauges, and valves to vessel, using handtools or power wrenches. Replaces defective parts, using power wrenches, prying bars, or handtools. May install and repair refractory brick. May thread and install stay bolts, using pipe wrench and dies. May remove and replace rivets and caulk seams to repair riveted shells and structures, using pneumatic chisel, riveter, and caulking hammer. May cut out defective parts, using acetylene torch.

#### **BRICKLAYER**

Lays building materials, such as brick, structural tile, and concrete cinder, glass, gypsum, and terra cotta block to construct or repair walls, partitions, arches, sewers, and other structures: Lays brick pavers for sidewalks. Measures distance from reference points and marks guidelines on working surface to lay out work. Spreads soft bed (layer) of mortar that serves as base and binder for block, using trowel. Applies mortar to end of block and positions block in mortar bed. Taps block with trowel to level, align, and embed in mortar, allowing specified thickness of joint. Removes excess mortar from face of block, using trowel. Finishes mortar between brick with pointing tool or trowel. Breaks bricks to fit spaces too small for whole brick, using plumb bob, gaugeline (tightly stretched cord), and level. Fastens brick or terra cotta veneer to face of structures, with tie wires embedded in mortar between bricks, or in anchor holes in veneer brick. May weld metal parts to steel structural members. May apply plaster to walls and ceiling using trowel, to complete repair work.

Lays firebrick and refractory tile to build, rebuild, reline, or patch high-temperature or heating equipment, such as boilers, ovens, furnaces, converters, cupolas, ladles, and soaking pits, according to job orders and blueprints: Lays out work, using chalklines, plumb bobs, tapes, squares, and levels. Calculates angles and courses for building walls, arches, columns, corners and bottoms. Removes burned or damaged brick and cleans surface of setting, using sledgehammer, pry bar, pneumatic chipping gun, scraper and wire brush. Cuts firebrick or refractory materials to size, using brick hammer or powered abrasive saw with refractory or firebrick blade. Spreads fire-clay mortar over brick with trowel and lays brick in place. Spreads or sprays refractories over exposed bricks to protect bricks against deterioration by heat, using trowel or spray gun. Positions or bends special frame or hanger over casings to lay arches. Cuts, notches, or drills openings to provide outlets, pyrometer mountings, brackets and heating elements, using handtools. Patches or replaces firebrick linings of ladles and furnace tap holes. Constructs refractory forms for controlling quantity and flow of molten materials from furnace to rolling machines. May replace bolts, brackets, and heating elements, repair coke oven doors, weld cracks or holes in shell, or perform other repairs. May

pack insulation into shells and frames to insulate heating equipment, such as furnaces, boilers, and ovens.

Sets stone to build stone structures, such as piers, walls and abutments, or lays walks, curbstones, or special types of masonry, such as alberene (acid-resistant soapstone for vats, tanks, and floors), using mason's tools: Shapes stone preparatory to setting, using chisel hammer, and other shaping tools. Spreads mortar over stone and foundation with trowel and sets stone in place by hand or with aid of crane. Aligns stone with plumbline and finishes joints between stone with pointing trowel. May spread mortar along mortar guides to ensure joints of uniform thickness. May clean surface of finished wall to remove mortar, using muriatic acid and brush. May set cut and dressed ornamental and structural stone in buildings.

# **CARPENTER**

Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's handtools and power tools, and conforming to local building codes: Studies blueprints, sketches, or building plans for information pertaining to type of material required, such as lumber or fiberboard, and dimensions of structure or fixture to be fabricated. Selects specified type of lumber or other materials. Prepares layout, using rule, framing square, and calipers. Marks cutting and assembly lines on materials, using pencil, chalk, and marking gauge. Shapes materials to prescribed measurements, using saws, chisels, and planes. Assembles cut and shaped materials and fastens them together with nails, dowel pins, or glue. Verifies trueness of structure with plumb bob and carpenter's level. Erects framework for structures and lays subflooring. Builds stairs and lays out and installs partitions and cabinet work. Covers subfloor with building paper to keep out moisture and lays hardwood, parquet, and wood-strip-block floors by nailing floors to subfloor or cementing them to mastic or asphalt base. Applies shock-absorbing, sound-deadening, and decorative paneling to ceilings and walls. Fits and installs prefabricated window frames, doors, doorframes, weather stripping, interior and exterior trim, and finish hardware, such as locks, letterdrops, and kick plates. Constructs forms and chutes for pouring concrete. Erects scaffolding and ladders for assembling structures above ground level. May weld metal parts to steel structural members. Installs insulation (not sprayed urethane or polyurethane) in connection with carpentry work. Builds rough wooden structures, such as concrete forms, scaffolds, tunnel and sewer supports, and temporary frame shelters, according to sketches, blueprints, or oral instructions: Examines specifications to determine dimensions of structure. Measures boards, timbers, or plywood, using square, measuring tape, and ruler and marks cutting lines on materials, using pencil and scriber. Saws boards and plywood panels to required sizes. Nails cleats (braces) across boards to construct concrete-supporting forms. Braces forms in place with timbers, tie rods, and anchor bolts, for use in building concrete piers, footings, and walls. Erects chutes for pouring concrete. Cuts and assembles timbers to build trestles and cofferdams. Builds falsework to temporarily strengthen, protect, or disguise buildings undergoing construction. Erects scaffolding for buildings and ship structures and installs ladders, handrails, walkways, platforms, and gangways. Installs door and window bucks (rough frames in which finished frames are inserted) in designated positions in building framework, and braces them with boards nailed to framework. Installs subflooring in buildings. Nails plaster grounds (wood or metal strips) to studding to provide guide for plasterer. Fits and nails sheathing (first covering of boards) on outer walls and roofs of buildings.

Plans gypsum drywall installations, erects metal framing and furring channels for fastening drywalls, and installs drywall to cover walls, ceilings, soffits, shafts, and movable partitions

in residential, commercial, and industrial buildings: Reads blueprints and other specifications to determine method of installation, work procedures, and material, tool, and work aid requirements. Lays out reference lines and points for use in computing location and position of metal framing and furring channels and marks position for erecting metalwork, using chalkline. Measures, marks, and cuts metal runners, studs, and furring channels to specified size, using tape measure, straightedge and hand-and portable power-cutting tools. Secures metal framing to walls and furring channels to ceilings, using hand and portable power tools. Measures and marks cutting lines on drywall, using square, tape measure, and marking devices. Scribes cutting lines on drywall, using straightedge and utility knife and breaks board along cut lines. Fits and fastens board into specified position on wall, using screws, hand or portable power tools, or adhesive. Cuts openings into board for electrical outlets, vents or fixtures, using keyhole saw or other cutting tools. Measures, cuts, assembles and installs metal framing and decorative trim for windows, doorways, and vents. Fits, aligns, and hangs doors and installs hardware, such as locks and kickplates.

Installs plasterboard or other wallboard to ceiling and interior walls of building, using handtools and portable power tools: Installs horizontal and vertical metal or wooden studs for attachment of wallboard on interior walls, using handtools. Cuts angle iron and channel iron to specified size, using hacksaw, and suspends angle iron grid and channel iron from ceiling, using wire. Scribes measurements on wallboard, using straightedge and tape measure, and cuts wallboard to size, using knife or saw. Cuts out openings for electrical and other outlets, using knife or saw. Attaches wallboard to wall and ceiling supports, using glue, nails, screws, hammer, or powered screwdriver. Trims rough edges from wallboard to maintain even joints, using knife. Nails prefabricated metal pieces around windows and doors and between dissimilar materials to protect drywall edges. May remove plaster, drywall, or paneling during renovation project, using crowbar and hammer. Installs metal molding at corners in lieu of sealant and tape.

# **CEMENT FINISHER**

Smoothes and finishes surfaces of poured concrete floors, walls, sidewalks, or curbs to specified textures, using handtools or power tools, including floats, trowels, and screeds: Signals concrete deliverer to position truck to facilitate pouring concrete. Moves discharge chute of truck to direct concrete into forms. Spreads concrete into inaccessible sections of forms, using rake or shovel. Levels concrete to specified depth and workable consistency, using hand held screed and floats to bring water to surface and produce soft topping. Smoothes and shapes surfaces of freshly poured concrete, using straightedge and float or power screed. Finishes concrete surfaces, using power trowel, or wets and rubs concrete with abrasive stone to impart finish. Prepares cement surfaces by using a steel shotblaster, scarifier or diamond grinder. Removes rough or defective spots from concrete surfaces, using power grinder or chisel and hammer, and patches holes with fresh concrete or epoxy compound. Molds expansion joints and edges, using edging tools, jointers, and straight edge. May sprinkle colored stone chips, powdered steel, or coloring powder on concrete to produce prescribed finish. May produce rough concrete surface, using broom. May mix cement, using hoe or concrete-mixing machine. Mixes and applies epoxy to cement. May direct subgrade work, mixing of concrete, and setting of forms.

## **ELECTRICAL LINE WORKER**

Installs, maintains, repairs and replaces transmission and distribution power lines and circuits to conduct electrical energy outside of isolated plants and the property lines of any given property, but not electric signs, and not street electrical decorations, except when messenger or guy wire is necessary for support and when fed and controlled from the street. Directs workers in installing light poles or tower equipment, and determines whether light poles or tower equipment are properly aligned. Climbs poles and installs necessary hardware, including insulators, voltage regulators, capacitors or sectionalizers. Strings wire conductors between erected poles. Splices, solders, and insulates conductors and related wiring to join sections of power lines and, to connect transformers and electrical accessories. Constructs and installs ground wires and/or ground rods, guy wires and crossarms, including installing a brace for crossarm if needed. Installs footings for tower, if necessary.

Installs, maintains, repairs and replaces traffic signals. Assembles poles and other hardware, as well as the lighting fixture or traffic light. After the fixture is attached on the pole, directs workers in placing the pole. When the pole is set, attaches the pole with anchor bolts and then pulls and terminates cables. Cuts sensor loops in the asphalt and places sensors in the road for traffic signals. Programs control cabinets and after installation is complete, connects and tests power.

# **ELECTRICIAN**

Plans layout, installs, and repairs wiring (low voltage and high voltage\*), electrical fixtures, apparatus, and control equipment, including fiberoptic systems, alarm systems and telecommunication equipment\*: Plans new or modified installations to minimize waste of materials, provide access for future maintenance, and avoid unsightly, hazardous, and unreliable wiring, consistent with specifications and local electrical codes. Prepares sketches showing location of wiring and equipment, or follows diagrams or blueprints, ensuring that concealed wiring is installed before completion of future walls, ceilings, and flooring. Measures, cuts, bends, threads, assembles, and installs electrical conduit, using tools, such as hacksaw, pipe threader, and conduit bender. Drills holes in concrete for the placement of electrical wiring. Installs pull wire in empty conduit. Pulls wiring through conduit. Splices wires by stripping insulation from terminal leads, using knife or pliers, twisting or soldering wires together, and applying tape or terminal caps. Connects wiring to lighting fixtures and power equipment, using handtools. Installs control and distribution apparatus, such as switches, relays, and circuit-breaker panels, fastening in place with screws or bolts, using handtools and power tools. Connects power cables to equipment, such as electric range or motor, and installs grounding leads. Lays PVC pipe for main feed electric line. Tests continuity of circuit to ensure electrical compatibility and safety of components, using testing instruments, such as ohmmeter, battery and buzzer, and oscilloscope. Observes functioning of installed equipment or system to detect hazards and need for adjustments, relocation, or replacement.

# \* This is added as a clarification. These tasks have always been included within the description of tasks performed by Electricians.

# **ELEVATOR CONSTRUCTOR**

Assembles and installs electric and hydraulic freight and passenger elevators, escalators, and dumbwaiters, determining layout and electrical connections from blueprints: Studies

blueprints and lays out location of framework, counterbalance rails, motor pump, cylinder, and plunger foundations. Drills holes in concrete or structural steel members with portable electric drill. Secures anchor bolts or welds brackets to support rails and framework, and verifies alignment with plumb bob and level. Cuts prefabricated sections of framework, rails, and other elevator components to specified dimensions, using acetylene torch, power saw, and disc grinder. Installs cables, counterweights, pumps, motor foundations, escalator drives, guide rails, elevator cars, and control panels, using handtools. Connects electrical wiring to control panels and electric motors. Installs safety and control devices. Positions electric motor and equipment on top of elevator shaft, using hoists and cable slings.

# **GLAZIER**

Installs glass in windows, skylights, store fronts, and display cases, or on surfaces, such as building fronts, interior walls, ceilings, and tabletops: Marks outline or pattern on glass, and cuts glass, using glasscutter. Breaks off excess glass by hand or with notched tool. Fastens glass panes into wood sash with glazier's points, and spreads and smoothes putty around edge of panes with knife to seal joints. Installs mirrors or structural glass on building fronts, walls, ceilings, or tables, using mastic, screws, or decorative molding. Bolts metal hinges, handles, locks, and other hardware to prefabricated glass doors. Sets glass doors into frame and fits hinges. May install metal window and door frames into which glass panels are to be fitted. May press plastic adhesive film to glass or spray glass with tinting solution to prevent light glare. May install stained glass windows. May assemble and install metal-framed glass enclosures for showers.

### **INSULATOR**

Applies insulating material\* to exposed surfaces of structures, such as air ducts, hot and cold pipes, storage tanks, and cold storage rooms; Reads blueprints and selects required insulation material (in sheet, tubular, or roll form), such as fiberglass, foam rubber, styrofoam, cork, or urethane, based on material's heat retaining or excluding characteristics. Prepares and applies fire stopping materials. Brushes adhesives on or attaches metal adhesive-backed pins to flat surfaces as necessary to facilitate application of insulation material. Measures and cuts insulation material to specified size and shape for covering flat or round surfaces, using tape measure, knife, or scissors. Fits, wraps, or attaches required insulation material around or to structure, following blueprint specifications. Covers or seals insulation with preformed plastic covers, canvas strips, sealant, or tape to secure insulation to structure, according to type of insulation used and structure covered, using staple gun, trowel, paintbrush, or caulking gun.

# \* Note: Installation of insulation is also found in other classifications relating to other trades.

### **IRONWORKER**

Performs any combination of following duties (working as a member of a crew) to raise, place, and unite girders, columns, and other structural-steel, iron or fiber-reinforced polymers or other plastic members\* to form completed structures or structure frameworks and performs any combination of following duties to raise and place girders, columns or other members when performing demolition of completed structures or structure framework if material will

be re-used: Sets up hoisting equipment for raising and placing members. Fastens members to cable of hoist, using chain, cable, or rope. Signals worker operating hoisting equipment to lift and place member. Guides member, using tab line (rope) or rides on member in order to guide it into position. Pulls, pushes, or pries members into approximate position, using turnbuckles, crowbars, jacks, and handtools. Aligns rivet holes in member with corresponding holes in previously placed member by driving drift pins or handle of wrench through holes. Verifies vertical and horizontal alignment of members, using plumb bob and level. Bolts aligned members to keep them in position until they can be permanently riveted, bolted, or welded in place. Catches hot rivets tossed by rivet heater (heat treating) in bucket and inserts rivets in holes, using tongs. Bucks (holds) rivets while riveter, pneumatic, uses air-hammer to form heads on rivets. Cuts and welds members to make alterations, using oxyacetylene welding equipment.

Positions and secures steel bars in concrete forms to reinforce concrete: Determines number, sizes, shapes, and locations of reinforcing rods from blueprints, sketches, or oral instructions. Selects and places rods in forms, spacing and fastening them together, using wire and pliers. Cuts bars to required lengths, using hacksaw, bar cutters, or acetylene torch. May bend steel rods with handtools or rodbending machine. May reinforce concrete with wire mesh. May weld reinforcing bars together, using arc- welding equipment. Welds deck pans on a bridge, reinforcing supports for the concrete structure.

Erects, trims, and fits together by means of bolts and clamps, iron grills, grating, and special stairways. Erects ornamental enclosures and other ironwork not included in structural ironwork. Installs chain link fences. Fastens ironwork to walls of buildings by means of bolts, brackets or anchors. Fastens newel posts, balusters, and other parts of stairways by fastening to supports or embedding them in sockets. Forges, welds, drills, and cuts as needed. Erects precast wall panels and prestressed roof panels by bolting, clamping or welding at the bottom to footing and at the top to steel joints as needed.

# \* Hereinafter, "member/s" refers to structural steel, iron or fiberreinforced polymers or other plastic material.

# **LABORER**

Laborers may not assist mechanics in the performance of mechanic's work using tools peculiar to an established trade. Their work is to be confined to the following manual tasks:

- Digging and filling holes and trenches;
- Removes excess dirt or grout away by hand from augers as the auger progresses;
- Except as provided in other classifications, loading, unloading and stockpiling materials;
- Cleaning and sweeping;
- Driving stakes;
- Stripping forms;
- Ripping out material which is to be discarded;
- Ground clean-up of roof removal work. Performs roof removal work for demolition (Roof removal work for roof replacement is performed by Roofers;)
- Clearing and grubbing;
- Flagging;

- Replacing painted lines on a road with tape strips, lays strips;
- Using a tool driven by compressed air, gas, or electric power to perform such work as breaking old pavement, loosening or digging hard earth, trimming bottom and sides of trenches, breaking large rocks, driving sheeting, chipping concrete, trimming or cutting stone, caulking steel plates, or compaction of earthen backfill;
- Mopping, brushing or spreading paint or bituminous compounds over surfaces for protection. Spraying materials such as water, sand, steam, vinyl, paint or stucco through hose to clean, coat or seal surfaces;
- Tending a stationary or portable liquid asphalt kettle, starting fires (usually fuel oil) under the kettle, controlling heat applied to the kettle by regulating dials or burners, maintaining desired temperature in asphalt, regulating valves for discharge of asphalt from kettle; --Cleaning and pouring asphalt joints in concrete paving with nozzle or can; Taking care of asphalt kettle and kettle heaters;
- Operating control lever on non-powered asphalt spreader pulled behind dump truck, operating the screed on the back of an asphalt spreader;
- Distributing asphaltic road-building materials evenly over road surface by raking and brushing materials to correct thickness; may control straightedge to regulate width and depth of materials; directing "Asphalt Shovelers" when to add or take away material to fill low spots or to reduce high spots;
- Manually operating a stationary or portable batching scale that weighs out concrete materials; adjusting scales for required weight of the materials; operating controls that admit materials separately from storage hoppers to weighing bins; observing scales or indicators that show when proper amount of materials have been made; discharging materials from weighing bin into truck or other carrier or mixer; measuring materials by volume instead of weight;
- Assisting in the pouring of concrete by spreading concrete, cleaning and caring of cement mason's tools, mixing mortar used in the patching of concrete, and performing other tasks as may be directed by cement mason or plasterer; Mixing mortar for plasterers and delivering same to location where plasterer is working; setting up scaffolding as directed by foreman where necessary, and cleaning and caring for tools and equipment used in the preparation and application of plaster;
- Operating a power driven chain saw to clear areas of timber; fells trees and sometimes cuts the fallen trees into short sections to facilitate their removal;
- Operating chippers and/or stump grinders;
- Operating a device used to burn holes, etc., through concrete; (this device consists of a
- consumable aluminum- magnesium rod inside a small iron pipe; oxygen is forced through the pipe under pressure, and the end of the assembly is lighted; the concrete is melted by the intense heat of the device);
- Driving self-propelled buggy to transport concrete from mixer or source of supply to place of deposit, operating levers to dump load, operating buggy by pushing or pulling by hand between mixer or other source to site of work;
- Operating small remote control vibrating compactor (such as a "whacker") in trenches;
- Preparing the surfaces of concrete masonry which is not to be finished (using tools other than those normally used by "Cement Masons") by patching holes and broken corners, and removing high spots and defective concrete;
- Operating a power driven, hand guided, water cooled saw which is used to cut through slabs of concrete, except as otherwise provided elsewhere;
- Cuts brick, cinder block and concrete slabs using power abrasive saw, including handheld, table or walk-behind saw;

- Operating a machine which applies asphalt or concrete along the edge of highways or parking aprons to form a small curb;
- Using a cutting torch for demolition work on steel or other metal structures;
- Cleaning and vacuuming heating and air conditioning ductwork that does not involve any dismantling, reassembling, cutting or bending sheet metal;
- Disassembling lead ductwork for demolition;
- Removal of sheet metal ductwork for demolition;
- Fitting together, aligning and grading metal road forms for holding concrete in place on road and street surfaces; dismantling, moving and cleaning forms after concrete hardens;
- Installing preformed wire baskets by tapping hooks along the edge of the basket to keep it in place on highway projects;
- Keeping stakes and stringline set in place out in front of trenching machine so that machine will cut ditch in correct location; setting stakes so that pipelayers can fine-grade ditch and measure from the batter board down to correct depth of ditch;
- Assisting operator and handling the equipment and directing the placing of concrete or mortar that is moved by pressure or pneumatic equipment, such as gunite; may fine-grade and place wire mesh at times; may perform other related semi- skilled duties.
- Assisting brickmasons, stonemason, and blockmasons by preparing mortar mix, either by hand or machine, delivering material to masons on scaffold, operating small material moving equipment such as power buggy, hoists, mortar mix pumps and other similar equipment; erects and dismantles bricklayer scaffolds.
- Constructing a means of permanent access to water and sewer lines for maintenance purposes. Work consists of laying brick or concrete block starting form a concrete slab at bottom of ditch up to an approximate grade line near the surface of the ground; brick or block is laid in by eyesight and is normally not to a plumb line; chipped or culled brick can be used and quite often is; no effort may be made to keep mortar off the face of the brick and joints are not pointed; applies coating of concrete to interior and exterior surfaces, except where tools of the trade are involved, performs other related duties.
- Mechanically mixing mortar ingredients to proper consistency and delivering to mason on scaffold or at site of work; keeping materials supplied to mason and assisting according to directions of mason;
- Assembling large diameter metal culverts by bolting together semi-circular pieces of metal to form a complete circle, and bolting each section of this circle to similar sections which are placed adjacently, repeating these processes until the required length of culvert is formed.
- On utility projects, laying tile, concrete, or corrugated metal pipe; receiving pipe lowered from top of trench; inserting spigot end of pipe into bell end of last laid pipe; adjusting pipe to line and grade; sealing joints with cement or other sealing compound;
- On highway projects, receiving, laying connecting (by means other than welding) and sealing joints of pipes;
- Mixing plaster to be used in a machine which is designed to apply plaster to surfaces by means of a hose; handling and maintaining hose, placing and moving machine, and servicing and maintaining machine;
- Cleaning, screening and feeding sand to hopper or pot of sandblasting machine;
- Supervising and assisting in locating, loading, and firing blast holes for breaking up hard materials; enlarging bottom of drilled holes by discharging small quantities of explosives; inserting detonator in charge of explosive, attaching fuse or electric wires, the stick and detonator forming a primer, the discharge of which effects the discharge of

the remainder of the explosive; charging hole by placing explosive, including stick that contains detonator, in hole and tamping with a pole; depressing handle of blasting machine or lights fuse to fire explosive; may use prima-cord or delay caps;

- Carrying powder or other explosive to blaster or powderman and assisting by placing prepared explosive in hole, connecting lead wire to blasting machine, and performing other duties as directed;
- Attaching and assisting in the installation of guardrails (other than guardrails on bridges), guardrail posts, informational signs, and metal fencing (including barbed wire and woven wire, excluding chain link and security fencing) which is used to define right of way, medians, or driving lanes or provide safety for such areas using small hand tools such as hammer and spud wrench;
- Cleaning and preparing surfaces by the use of sandblasting equipment; sanding floors using buff machines or floor sanding machines;
- Cleaning and dressing the slopes of roadway cuts and embankments while suspended by ropes or cables using hand tools as required;
- Lowering hose-like flexible shaft of vibrator into newly poured concrete; starting power unit and holding shaft, allowing hammerhead on shaft to vibrate, thus compacting the concrete (air, electric, or gasoline operated vibrators are used);
- Operating hand guided vibratory or impact compactor, adjusting levers, throttles and other devices necessary for operation;
- Setting up and operating drilling mechanism that drills holes into concrete of rock; leveling machine by placing timbers under wheels; inserting and fastening drill steel in chuck; adjusting angle of drill tower and bolts into position; controlling drilling and speed of drill by moving levers;
- Assisting in setting up drill, assorting drill steels, and inserting drill steel into drill chuck (as Wagon, Air Track, Drill and Diamond Drillers' Tender Outside); Lubricating drill;
- Cleans and washes windows;
- Handling the equipment and directing the placing of concrete or mortar 1 1/2" thickness or over that is moved by pneumatic equipment; may fine-grade; installing concrete around electrical conduits after pull-wires have been installed;
- Performing landscaping duties including site development, soil preparation, fertilizing, the building of garden accessories, preparation for the installation of garden sprinkler systems; operating small walking type farm equipment; duties shall not include electrical work, fencing, concrete retaining walls, or other work which is generally performed by skilled craftsmen;
- Assisting divers by performing tasks such as handling concrete hoses; handing tools to divers; delivering materials and monitoring two-way communication boxes; pouring epoxy material into piling encasements.

# MILLWRIGHT

Installs machinery and equipment according to layout plans, blueprints, and other drawings in industrial establishment, using hoists, lift trucks, handtools, and power tools: Reads blueprints and schematic drawings to determine work procedures. Dismantles machines, using hammers, wrenches, crowbars, and other handtools. Moves machinery and equipment, using hoists, dollies, rollers, and trucks. Assembles and installs equipment, such as shafting, conveyors, and tram rails, using handtools and power tools. Constructs foundation for machines, using handtools and building materials, such as wood, cement, and steel. Aligns

machines and equipment, using hoists, jacks, handtools, squares, rules, micrometers, and plumb bobs. Assembles machines, and bolts, welds, rivets, or otherwise fastens them to foundation or other structures, using handtools and power tools. May operate engine lathe to grind, file, and turn machine parts to dimensional specifications. May repair and lubricate machines and equipment. May install robot and modify its program, using teach pendant. May perform installation and maintenance work as part of team of skilled trades workers.

# **PAINTER**

Applies coats of paint, varnish, stain, enamel, or lacquer to decorate and protect interior or exterior surfaces, trimmings, and fixtures of buildings and other structures, including painting of roadway markings and lines\*: Reads work order or receives instructions from supervisor regarding painting. Smoothes surfaces, using sandpaper, brushes, or steel wool, and removes old paint from surfaces, using paint remover, scraper, wire brush, or blowtorch to prepare surfaces for painting. Fills nail holes, cracks, and joints with caulk, putty, plaster, or other filler, using caulking gun and putty knife. Selects premixed paints, or mixes required portions of pigment, oil, and thinning and drying substances to prepare paint that matches specified colors. Removes fixtures, such as pictures and electric switchcovers from walls prior to painting, using screwdriver. Spreads drop cloths over floors and room furnishings, and covers surfaces, such as baseboards, door frames, and windows with masking tape and paper to protect surfaces during painting. Paints surfaces, using brushes, spray gun, or paint rollers. Simulates wood grain, marble, brick, or tile effects. Applies paint with cloth, brush, sponge, or fingers to create special effects. Erects scaffolding or sets up ladders to perform tasks above ground level. May be designated according to type of work performed as Painter, Interior Finish (construction); Painter, Maintenance (any industry); or according to type of material used as Calciminer (construction); Varnisher (construction). May also hang wallpaper and fabrics. May wash surfaces prior to painting with mildew remover, using brush.

Seals joints between plasterboard or other wallboards to prepare wall surface for painting or papering: Mixes sealing compound by hand or with portable electric mixer, and spreads compound over joints between boards, using trowel, broadknife, or spatula. Presses paper tape over joint to embed tape into compound and seal joint, or tapes joint, using mechanical applicator that spreads compound and embeds tape in one operation. Spreads and smoothes cementing material over tape, using trowel or floating machine to blend joint with wall surface. Sands rough spots after cement has dried. Fills cracks and holes in walls and ceiling with sealing compound. May countersink nails or screws below surface of wall prior to applying sealing compound, using hammer or screwdriver.

# \* This is added as a clarification. These tasks have always been included within the description of tasks performed by Painters.

# PILE DRIVER

Performs work involving pilings or sheeting of wood, concrete, steel or plastic on wharves, piers, docks, bulkheads, jetties, wooden bridges, ferry slips and pile foundations, including boring operations for the installation of auger cast piles. Sets up and tends all pile test loads. Performs any combination of the following duties in pile driving operations to raise and place wooden or concrete piles or steel sheeting: Sets up hoisting equipment for raising and placing wooden or concrete piles or steel sheeting sections to cable of hoist, using chain, cable or

rope. Signals worker operating hoisting equipment to lift and place the wooden or concrete pile or steel sheeting section. Guides wooden or concrete pile or steel sheeting section, using tab line (rope) or rides on pile or steel sheeting to guide it into position. Pulls, pushes or pries wooden or concrete pile or steel sheeting into place while pile or sheeting is supported by hoisting equipment. Dresses and caps the pilings which have been driven, and prepares them to receive the superstructure. Performs work in connection with shoring systems replacing sheeting (krings system and lagging). Installs tie-backs for the shoring system and tests shoring system.

Perform placement of rings, shores, bracing and jacking of all piles on the underpinning of buildings, bridges, railroads and all other underpinning operations. Handles, sets, secures, cuts and drills pre-cast piles and pile caps on bridges, piers, docks and wharves. Handles, sets, secures, cuts and drills pre-cast decking on piers, docks and wharves.

Repairs deteriorated pilings by installing a pile encasement.

# PLASTERER

Applies coats of plaster to interior walls, ceilings, and partitions of buildings, to produce finished surface, according to blueprints, architect's drawings, or oral instructions, using handtools and portable power tools: Directs workers to mix plaster to desired consistency and to erect scaffolds. Spreads plaster over lath or masonry base, using trowel, and smoothes plaster with darby and float to attain uniform thickness. Sprays fireproof insulation onto steel beams. Applies scratch, brown, or finish coats of plaster to wood, metal, or board lath successively. Roughens undercoat with scratcher (wire or metal scraper) to provide bond for succeeding coats of plaster. Creates decorative textures in finish coat by marking surface of coat with brush and trowel or by spattering surface with pebbles. May install lathing. May mix mortar. May install guide wires on exterior surface of buildings to indicate thickness of plaster to be applied. May install precast ornamental plaster pieces by applying mortar to back of pieces and pressing pieces into place on wall or ceiling.

Molds and installs ornamental plaster panels and trim, and runs (casts) ornamental plaster cornices and moldings by either of following methods: (1) Spreads freshly mixed plaster on table or in forms with trowel when molding and installing ornamental trim. Shapes plaster by hand, using template and cuts trim to size after plaster has hardened. Applies coat of plaster to wall and presses trim into position. (2) Nails wooden strips to wall and ceiling to serve as guide for template when casting (running) cornices or moldings. Applies plaster to wall or ceiling, using trowel. Pushes template over plaster, striking off excess plaster until desired shape and smoothness of molding is obtained.

Applies weatherproof, decorative covering of Portland cement or gypsum plaster to outside building surfaces, using handtools. Decorates final or finish coat by marking coat with sand, or with brush or trowel, or by spattering with small stones. May nail wire mesh, lath, or similar material to outside surfaces to serve as binding device to hold stucco in place. May apply stucco, using spray gun. May install guide wires on surface of buildings to indicate thickness of stucco to be applied.

# PLUMBER/PIPEFITTER/STEAMFITTER

Lays out, assembles, installs, and maintains pipe systems, pipe supports, and related hydraulic and pneumatic equipment, for steam, hot water, heating, cooling, lubricating,

sprinkling, and industrial production and processing systems, applying knowledge of system operation, and following blueprints: Unloads and handles material to be used by plumbers and pipefitters under this definition; Selects type and size of pipe, and related materials and equipment, such as supports, hangers, and hydraulic cylinders, according to specifications. Inspects work site to determine presence of obstructions and to ascertain that holes cut for pipe will not cause structural weakness. Plans installation or repair to avoid obstructions and to avoid interfering with activities of other workers. Cuts pipe, using saws, pipe cutter, hammer and chisel, cutting torch, and pipe cutting machine. Threads pipe, using pipe threading machine. Bends pipe, using pipe bending tools and pipe bending machine. Assembles and installs a variety of metal and nonmetal pipes, tubes, and fittings, including iron, steel, copper, and plastic. Connects pipes, using threaded, caulked, soldered, brazed, fused, or cemented joints and handtools. Secures pipes to structure with brackets, clamps, and hangers, using handtools and power tools. Installs and maintains hydraulic and pneumatic components of machines and equipment, such as pumps and cylinders, using handtools. Installs and maintains refrigeration and air-conditioning systems, including compressors, pumps, meters, pneumatic and hydraulic controls, and piping, using handtools and power tools, and following specifications and blueprints. Increases pressure in pipe system and observes connected pressure gauge to test system for leaks. May weld pipe supports to structural steel members. May operate machinery to verify repair. May operate machinery to verify repair. May modify programs of automated machinery, such as robots and conveyors, to change motion and speed of machine, using teach pendant, control panel, or keyboard and display screen of robot controller and programmable controller. May be designated Steam Fitter when installing piping systems that must withstand high pressure.

Assembles, installs, and repairs pipes, fittings, and fixtures of heating, water, and drainage systems, according to specification and plumbing codes: Studies building plans and working drawings to determine work aids required and sequence of installations. Inspects structure to ascertain obstructions to be avoided to prevent weakening of structure resulting from installation of pipe. Locates and marks position of pipe and pipe connections and passage holes for pipes in walls and floors, using ruler, spirit level, and plumb bob. Cuts openings in walls and floors to accommodate pipe and pipe fittings, using handtools and power tools. Cuts and threads pipe, using pipe cutters, cutting torch, and pipe-threading machine. Bends pipe to required angle by use of pipe-bending machine or by placing pipe over block and bending it by hand. Assembles and installs valves, pipe fittings, and pipes composed of metals, such as iron, steel, brass, and lead, and nonmetals, such as glass, vitrified clay, and plastic, using handtools and power tools. Joins pipes by use of screws, bolts, fittings, solder, plastic solvent, and caulks joints. Fills pipe system with water or air and reads pressure gauges to determine whether system is leaking. Installs and repairs plumbing fixtures, such as sinks, commodes, bathtubs, water heaters, hot water tanks, garbage disposal units, dishwashers, and water softeners. Repairs and maintains plumbing by replacing washers in leaky faucets, mending burst pipes, and opening clogged drains. May weld holding fixtures to steel structural members.

Test, adjust and balance heating and cooling piping systems in commercial and industrial buildings using specialized tools and equipment to attain performance standards specified in system design. Adjusts flow control valves in piping to balance system, using hand tools such as pliers, screwdriver, and wrenches. Work with balancing personnel to perform tests to see if the heating and cooling systems are operating to specifications and detect malfunctions in piping system component parts.

### **POWER EQUIPMENT OPERATOR**

Operates Steel and Stone handling equipment in connection with erection; Operates cranes, machine-handling machinery, cable spinning machine, helicopters, backhoes, cableways, conveyor loader, drag lines, keystones, all types of shovels, derricks, trench shovels, trenching machines, pippin type backhoe, hoists, pavers, milling machine, mucking machine, gradalls, front-end loaders, tandem scraper, drills (self- contained Drillmaster type), fork lift, motor patrols, batch plant with mixer, scraper and tournapull, rollers, spreaders, pan trucks, bulldozers, tractors, conveyors, pressure boilers, well drillers, ditch witch type trenchers, concrete breaking machines, fine grade machines, seamen pulverizing mixer, form line graders, road finishing machines, power boom, seed spreader, grease truck (to provide fuel, lubrication and service for power equipment), wellpoints, compressors, pumps and machines similar to above. Sets up hollow stem auger equipment for attachment to crane. Included in this classification are mechanics for power equipment, tiremen on power equipment, asphalt plant engineers, maintenance engineer (power boat), firemen, oilers and deck hands (personnel boats), and grease truck helper.

### **ROOFER – COMPOSITION**

Applies low slope composition roofing materials including insulation incidental to the roof system. Covers low slope roofs with composition sheet, liquid, semi-liquid and/or spray applied roofing materials (other than sheet metal) to construct Built Up (BUR), Modified Bitumen, Single-Ply Membrane and Spray In Place foam roof systems. Applies low slope roof substrate materials used as vapor barrier, fireproofing, support or attachment surfaces for composition roof systems to the roof deck. Applies rigid insulation, including composite insulations having nailable surfaces bonded to the insulation, when used as components of low sloped roof systems or with waterproofing. Applies mineral aggregate, gravel, slag, ballast, pavers, protection boards, walkway pads and roof treads when used to surface or protect low slope composition roof systems or waterproofing. Installs base flashings, curb flashings and counter-flashings used to roof or waterproof intersecting surfaces on low slope roofs. Applies components of low slope composition roofing systems used to seal, coat and maintain the roof including roof cements, reinforcements, finishing and toppings. Applies spray-in-place foams such as urethane, polyurethane or polyisocyanurate and the coatings applied over them when used for roofing and waterproofing. Applies bituminous or asphalticbased sheet, liquid, semi-liquid and/or pre-formed panels as necessary to waterproof low slope roofing system. Removes existing low slope composition roof materials in connection with the installation of a new composition roof at the same location.

## **ROOFER – SHINGLE, SLATE AND TILE**

Applies shingle, slate and tile roofing materials (including insulation incidental to the roof system) on steep slope roofs. Applies roofing felt, paper, membrane, ice shield or vapor barrier as layer beneath shingle, slate and tile roofs. Aligns steep slope roofing material with roof edge and overlaps successive layers. Gauges distance of overlap with chalkline, gauge on shingling hatchet, or by lines on shingles. Fastens shingles to roof with asphalt, cement, or nails. Cuts and punches holes in slate, tile, terra cotta or wood roofing shingles using punch and hammer. Applies rigid insulation, including composite insulation having nailable surfaces bonded to the insulation, to steep slope roofs where such insulation is related to the

application of shingle, slate and/or tile roofing materials. May construct and install prefabricated roof sections to rafters. Removes existing shingle, slate and/or tile roof materials in connection with the application of a new shingle, slate and/or tile roof at the same location.

# SHEET METAL WORKER

Plans, lays out, fabricates, assembles, installs, and repairs sheet metal parts, equipment, and products, utilizing knowledge of working characteristics of metallic and nonmetallic materials, machining, and layout techniques, using handtools, power tools, machines, and equipment: Reads and interprets blueprints, sketches, or product specifications to determine sequence and methods of fabricating, assembling, and installing sheet metal products. Selects gauge and type of sheet metal, such as galvanized iron, copper, steel, or aluminum, or nonmetallic material, such as plastics or fiberglass, according to product specifications. Lays out and marks dimensions and reference lines on material, using scribers, dividers, squares, and rulers, applying knowledge of shop mathematics and layout techniques to develop and trace patterns of product or parts or using templates. Sets up and operates fabricating machines, such as shears, brakes, presses, forming rolls, and routers, to cut, bend, block and form, or straighten materials. Shapes metal material over anvil, block, or other form, using handtools. Trims, files, grinds, deburrs, buffs, and smoothes surfaces, using handtools and portable power tools. Welds, solders, bolts, rivets, screws, clips, caulks, or bonds component parts to assemble products, using handtools, power tools, and equipment. Installs assemblies in supportive framework according to blueprints, using handtools, power tools, and lifting and handling devices. Installs standing-seam metal roofs. Installs aluminum fascia on roofs. Inspects assemblies and installation for conformance to specifications, using measuring instruments, such as calipers, scales, dial indicators, gauges, and micrometers. Repairs and maintains sheet metal products. May operate computer-aided-drafting (CAD) equipment to develop scale drawings of product or system. May operate laser-beam cutter or plasma arc cutter to cut patterns from sheet metal.

Installs sheet metal ductwork to facilitate the movement of air. Disassembly of existing sheet metal ductwork in connection with the installation of new sheet metal ductwork at the same location. Cuts, patches, disassembles and reassembles ducts in duct-cleaning operations. Tests, adjusts, and balances heating, cooling, and ventilation systems in commercial and industrial buildings using specialized tools and test equipment to attain performance standards specified in system design. Studies system blueprints, specifications and performance data to determine configuration and purpose of system components, such as motors, pumps, fans, switches and ducts. Discusses systems malfunctions with users to isolate problems. Inspects systems to verify system compliance with plans and specifications and to detect malfunctions in system components parts. Adjusts system controls to settings recommended by vendor to prepare to perform tests. Tests performance of air systems, using specialized tools and test equipment, such as pitot tube, manometer, anemometer, velometer, tachometer, psychrometer, thermometer, to isolate problems and to determine where adjustments are necessary. Opens or closes louvers in system ductwork to balance system, using hand tools such as pliers, screwdrivers, or wrenches. Discusses system operations with users to verify that malfunctions have been corrected. Installs insulation (not sprayed urethane or polyurethane) incidental to sheet metal work.

## SOFT FLOOR LAYER

Applies blocks, strips, or sheets of shock-absorbing, sound- deadening, or decorative covering to floors, walls, and cabinets: Disconnects and removes obstacles, such as appliances and light fixtures. Sweeps, scrapes, sands, or chips dirt and irregularities from base surfaces, and fills cracks with putty, plaster, or cement grout to form smooth, clean foundation. Measures and cuts covering materials, such as rubber, linoleum or cork tile, and foundation material, such as felt, according to blueprints and sketches, using rule, straightedge, linoleum knife, and snips. Spreads adhesive cement over floor to cement foundation material to floor for sound-deadening, and to prevent covering from wearing at board joints. Lays out centerlines, guidelines, and borderlines on foundation with chalkline and dividers. Spreads cement on foundation material with serrated trowel. Lays covering on cement, following guidelines, to keep tile courses straight and butts edges of blocks to match patterns and execute designs. Joins sections of sheet covering by overlapping adjoining edges and cutting through both layers with knife to form tight joint. Rolls finished floor to smooth it and press cement into base and covering. May soften area of floor covering with butane torch to fit materials around irregular surfaces. May lay carpet.

Applies decorative steel, aluminum, and plastic tile (known as soft tile to distinguish from ceramic tile) to walls and cabinets of bathrooms and kitchens: Measures surface to locate center points and draws horizontal and vertical guidelines through them. Brushes waterproof compound over plaster surfaces to seal pores. Spreads adhesive cement over wall, using trowel or broad knife. Positions tile on cement, following specified pattern. Presses tile into cement. Removes excess cement from joints between tile to clean finished surface, using damp cloth or cleaning compound. Rolls sheet wall covering with hand roller to press into cement. May wipe grout into joints of tile to seal them.

# SPRINKLER FITTER

Installs and maintains all fire protection and fire control systems including the unloading, handling by hand, power equipment and installation of all piping or tubing, appurtenances and equipment pertaining thereto, including both overhead and underground water mains, fire hydrants and hydrant mains, standpipes and hose connections to sprinkler systems, sprinkler tank heaters, air lines and thermal systems used in connection with sprinkler and alarm systems, also all tanks and pumps connected thereto, also included shall be CO-2 and Cardox Systems, Dry Chemical Systems, Foam Systems, Halon and all other fire protection systems, the locating of and cutting or coring of all holes for piping and the setting of all sleeves and inserts required for the installation of the work.

## TERRAZZO/MARBLE/TILE SETTER

Cuts, tools, and sets marble slabs in floors and walls of buildings and repairs and polishes slab previously set in buildings: Trims, faces, and cuts marble to specified size, using power sawing, cutting, and facing equipment and handtools. Drills holes in slab and attaches bracket. Spreads mortar on bottom of slab and on sides of adjacent slabs. Sets block in position, tamps it into place, and anchors bracket attachment with wire. Fills joints with grout. Removes excess grout from marble with sponge. Cleans and bevels cracks or chips on slabs, using handtools and power tools. Heats cracked or chipped area with blowtorch and fills defect with composition mastic that matches grain of marble. Polishes marble and other ornamental stone to high luster, using power tools or by hand.

Applies cement, sand, pigment, and marble chips to floors, stairways, and cabinet fixtures to attain durable and decorative surfacing according to specifications and drawings: Spreads roofing paper on surface of foundation. Spreads mixture of sand, cement, and water over surface with trowel to form terrazzo base. Cuts metal division strips and presses them into terrazzo base so that top edges form desired design or pattern and define level of finished floor surface. Spreads mixture of marble chips, cement, pigment, and water over terrazzo base to form finished surface, using float and trowel. Scatters marble chips over finished surface. Pushes roller over surface to imbed chips. Allows surface to dry, and pushes electric-powered surfacing machine over floor to grind and polish terrazzo surface. Grinds curved surfaces and areas inaccessible to surfacing machine, such as stairways and cabinet tops, with portable hand grinder. May precast terrazzo blocks in wooden forms.

Applies tile to walls, floors, ceilings, and promenade roof decks, following design specifications: Examines blueprints, measures and marks surfaces to be covered, and lays out work. Measures and cuts metal lath to size for walls and ceilings with tin snips. Tacks lath to wall and ceiling surfaces with staple gun or hammer. Spreads plaster base over lath with trowel and levels plaster to specified thickness, using screed. Spreads concrete on subfloor with trowel and levels it with screed. Spreads mastic or other adhesive base on roof deck using serrated spreader to form base for promenade tile. Cuts and shapes tile with tile cutters and biters. Positions tile and taps it with trowel handle to affix tile to plaster or adhesive base.

## TERRAZZO/MARBLE/TILE FINISHER

Supplies and mixes construction materials for Marble Setter, applies grout, and cleans installed marble: Moves marble installation materials, tools, machines, and work devices to work areas. Mixes mortar, plaster, and grout, as required, following standard formulas and using manual or machine mixing methods. Moves mixed mortar or plaster to installation area, manually or using wheelbarrow. Selects marble slab for installation, following numbered sequence or drawings. Drills holes and chisels channels in edges of marble slabs to install metal wall anchors, using power drill and chisel. Bends wires to form metal anchors, using pliers, inserts anchors into drilled holes of marble slab, and secures anchors in place with wooden stake and plaster. Moves marble slabs to installation site, using dolly, hoist, or portable crane. Fills marble joints and surface imperfections with grout, using grouting trowel or spatula, and removes excess grout, using wet sponge. Grinds and polishes marble, using abrasives, chemicals, and manual or machine grinding and polishing techniques. Cleans installed marble surfaces, work and storage areas, installation tools, machinery, and work aids, using water and cleaning agents. Stores marble, installation materials, tools, machinery, and related items. May modify mixing, material moving, grouting, polishing, and cleaning methods and procedures, according to type of installation or materials. May repair and fill chipped, cracked, or broken marble pieces, using torch, spatula, and heat sensitive adhesive and filler. May secure marble anchors to studding, using pliers, and cover ends of anchors with plaster to secure anchors in place. May assist Marble Setter to saw and position marble. May erect scaffolding and related installation structures.

Supplies and mixes construction materials for Terrazzo Worker, applies grout, and finishes surface of installed terrazzo: Moves terrazzo installation materials, tools, machines, and work devices to work areas, manually or using wheelbarrow. Measures designated amounts of

ingredients for terrazzo or grout, using graduated containers and scale, following standard formulas and specifications, and loads portable mixer, using shovel. Mixes materials according to experience and requests from Terrazzo Worker and dumps mixed materials that form base or top surface of terrazzo into prepared installation site, using wheelbarrow. Applies curing agent to installed terrazzo to promote even curing, using brush or sprayer. Grinds surface of cured terrazzo, using power grinders, to smooth terrazzo and prepare for grouting. Spreads grout across terrazzo to fill surface imperfections, using trowel. Fine grinds and polishes surface of terrazzo, when grout has set, using power grinders. Washes surface of polished terrazzo, using cleaner and water, and applies sealer, according to manufacturer's specifications, using brush. Installs grinding stone in power grinders, using handtools. Cleans installation site, mixing and storage areas, tools, machines, and equipment, using water and various cleaning devices. Stores terrazzo installation materials, machines, tools, and equipment. May modify mixing, grouting, grinding, and cleaning procedures according to type of installation or material used. May assist Terrazzo Worker to position and secure moisture membrane and wire mesh prior to pouring base materials for terrazzo installation.

May spread marble chips or other material over fresh terrazzo surface and press into terrazzo, using roller. May cut divider and joint strips to size as directed. May cut grooves in terrazzo stairs, using power grinder, and fill grooves with nonskid material.

Supplies and mixes construction materials for Tile Setter, applies grout, and cleans installed tile: Moves tiles, tilesetting tools, and work devices from storage area to installation site manually or using wheelbarrow. Mixes mortar and grout according to standard formulas and request from Tile Setter, using bucket, water hose, spatula, and portable mixer. Supplies Tile Setter with mortar, using wheelbarrow and shovel. Applies grout between joints of installed tile, using grouting trowel. Removes excess grout from tile joints with wet sponge and scrapes corners and crevices with trowel. Wipes surface of tile after grout has set to remove grout residue and polish tile, using nonabrasive materials. Cleans installation site, mixing and storage areas, and installation machines, tools, and equipment, using water and various cleaning tools. Stores tile setting materials, machines, tools, and equipment. May apply caulk, sealers, acid, steam, or related agents to caulk, seal, or clean installed tile, using various application devices and equipment. May modify mixing, grouting, grinding, and cleaning procedures according to type of installation or material used. May assist Tile Setter to position and secure metal lath, wire mesh, or felt paper prior to installation of tile. May cut marked tiles to size, using power saw or tile cutter.

## TRUCK DRIVER

Operates dumps, dumpsters, escort and pilot vehicles, flat body material trucks, form trucks, greasers (to provide fuel, lubrication and service for trucks) and steamers, panel truck, pickups, rubber-tired towing and pushing vehicles, A-frames, agitators or mixers, asphalt distributors, low-boys, semi- trailers, tandems, batch truck, euclid type or similar off-highway equipment, off-highway tandem back-dump, specialized earth moving equipment, twin engine equipment and double-hitched equipment, and equipment similar to above. This classification also includes truck mechanics.

|   | DATE OF PREVAILING WAGE DETERMINATION USED ON THIS<br>PROJECT: | Net Hourly<br>Wages of Paid Educed   |     |     |     |     |        |     |     |     |
|---|--|--|-----|-----|-----|-----|--------|-----|-----|-----|
|   | VAGE DETER   | DEDUCTIONS   |     |     |     |     |        |     |     |     |
|   | VAILING  | EM 1   |     |     |     |     |        |     |     |     |
| ADDRESS:<br>PHONE:  | TE OF PRE<br>OJECT:  | GROSS<br>AMOUNT<br>EARNED FICA   |     |     |     |     |        |     |     |     |
|   | AN   | ATE N  |     |     |     |     |        |     |     |     |
|   | щ  | AY URS   |     |     |     |     |        |     |     |     |
| f Labor<br>ffairs<br>ard  | CONTRACT NUMBER  | CED EAC  |     |     |     |     |        |     |     |     |
| <b>tment o</b><br>ustrial A<br>le Boulev<br>104<br>DE 19702<br>1-3423   |  | RS WORH  |     |     |     |     |        |     |     |     |
| <b>Delaware Department of Labor</b><br>Division of Industrial Affairs<br>225 Corporate Boulevard<br>Suite 104<br>Newark, DE 19702<br>302-451-3423 |  | DAY & DATE & HOURS WORKED EACH DAY       T     W       T     W       T     W |     |     |     |     |        |     |     |     |
| <b>Delawa</b><br>Divisi<br>225<br>P   | DING DATE  | T W  |     |     |     |     |        |     |     |     |
|   | WEEK ENDING  | M  |     |     |     |     |        |     |     |     |
| _   | WE   | NO   | s O | s O | s O | s O | S<br>O | s 0 | s O | S O |
| ACTOR   |  | WORK<br>CLASSIFICATION   |     |     |     |     |        |     |     |     |
| PAYROLL REPORT<br>NAME OF CONTRACTOR   OR SUBCONTRACTOR   | PROJECT AND LOCATION   | NAME, ADDRESS AND<br>SOCIAL SECURITY NUMBER<br>OF EMPLOYEE                   |     |     |     |     |        |     |     |     |
| NAN   | PROJE  |  | ť   | 2.  | 3.  | 4.  | 5.     | 6.  | 7.  | ×.  |

DATE

(Name of signatory party) (Title)

That I pay or supervise the payment of persons employed by

do hereby state:

on the

(Contractor or Subcontractor)

(public project)

that during the payroll period commencing on the \_\_\_\_\_ day of

20 and ending on the day of

20 all persons employed on said project

have been paid the full weekly wages carned, that no rebates have been or will be made either directly or indirectly to or on behalf of the contractor or subcontractor from the full weekly wages carned by any person and that no deductions have been made either directly or indirectly from the full wages carned by any person, other than permissible deductions as defined in the prevailing wage regulations of the State of Delaware. That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work performed.

ci

That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a state apprenticeship agency recognized by the Bureau of Apprenticeship and Training. United States Department of Labor, and that the worksite ratio of apprentices to mechanics does not exceed the ratio permitted by the prevailing wage regulations of the State of Delaware.

ŝ

<u>An employer who fails to submit sworn payroll information to the Department of</u> Labor weekly shall be subject to fines of \$1,000.00 and \$5,000. for each violation.

List only those fringe benefits:

For which the employer has paid; and Which have been used to offset the full prevailing wage rate. (See Delaware Prevailing Wage Regulations for explanation of how hourly value of benefits is the be computed.)

| FITS                    | of record)                                    |          |    |    |    |    |    |    |          |    |
|-------------------------|---|----------|----|----|----|----|----|----|----------|----|
| HOURLY COST OF BENEFITS | (List in same order shown on front of record) |          |    |    |    |    |    |    |          |    |
| COST 0                  | der showr                                     |          |    |    |    |    |    |    |          |    |
| OURLY                   | same or                                       |          |    |    |    |    |    |    | <u>.</u> |    |
| H                       | (List in                                      |          |    |    |    |    |    |    |          |    |
|                         |   |          |    |    |    |    |    |    |          |    |
| のない、「「                  |   | Employee | 1. | 2. | 3. | 4. | s. | 6. | 7.       | 8. |
| 1000                    |   |          |    |    |    |    |    |    |          |    |

I hereby certify that the foregoing information is true and correct to the best of m knowledge and belief. I realize that making a false statement under oath is a crime in State of Delaware

| THIS DAY OF A.D. 20 |
|---------------------|

Notary Public

# **BID FORM**

| For Bids Due:            | 07/28/14 | To:    | Delaware Technical Community College - Stanton |
|--------------------------|----------|--------|--|
|                          |          |        | DTCC Department of Administrative Services     |
|                          |          |        | 400 Stanton-Christiana Road                    |
|                          |          | _      | Newark, DE 19713                               |
|                          |          |        |  |
| Name of Bidder:          |          |        |  |
| Delaware Business Licens | se No.:  | Тахра  | ver ID No.:                                    |
| City of Wilmington Licen | se No.:  | (Other | License Nos.):                                 |
| Phone No.: ( )           |          | Fax No |  |

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

| AMOUNT WRITTEN IN WORDS: |   |
|--------------------------|---|
| (\$                      | ) |

# ALTERNATES

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates.

| ALTERNATE No. 1 – Automatic Tempera   | ture Controls (ATC)    |   |  |
|---------------------------------------|------------------------|---|--|
| ADD: AMOUNT WRITTEN IN WORDS:         |                        |   |  |
|                                       | (\$                    | ) |  |
|                                       |                        |   |  |
| ALTERNATE No. 2 – Provide Basis of De | sign Fire Alarm System |   |  |
| ADD: AMOUNT WRITTEN IN WORDS          | :                      |   |  |
|                                       | (\$                    | ) |  |

# **BID FORM CONT.**

# **UNIT PRICES**

| UNIT PRICE No. 1: N/A       |            |   |  |
|-----------------------------|------------|---|--|
| AMOUNT WRITTEN IN WORDS:(\$ |            |   |  |
| UNIT PRICE No. 2: N/A       |            |   |  |
| AMOUNT WRITTEN IN WORDS:(\$ | N/A        | ) |  |
| UNIT PRICE No. 3: N/A       |            |   |  |
| AMOUNT WRITTEN IN WORDS:(\$ | <u>N/A</u> | ) |  |
| UNIT PRICE No. 4: N/A       |            |   |  |
| AMOUNT WRITTEN IN WORDS:(\$ | N/A<br>-   | ) |  |
| UNIT PRICE No. 5: N/A       |            |   |  |
| AMOUNT WRITTEN IN WORDS:(\$ | N/A<br>-   | ) |  |
| UNIT PRICE No. 6: N/A       |            |   |  |
| AMOUNT WRITTEN IN WORDS:(\$ | N/A<br>-   | ) |  |

# **ACKNOWLEDGEMENTS**

I/We acknowledge that we have reviewed and are responsible for the entire set of bid documents. This includes all the specifications and drawings listed in the table of contents and drawing list. \_\_\_\_\_(initials)

I/We acknowledge that we have reviewed the schedule specification, construction schedule and phasing. We have included any and all necessary manpower, multiple shifts and overtime expenses to complete the tasks in accordance with the phasing and in the durations noted in the bid schedule. This is to include accounting for concurrent activities in the work area. \_\_\_\_\_(initials)

I/We acknowledge Addendums numbered \_\_\_\_\_\_ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for <u>30</u> days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid.

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received. PAGE 2 OF 7 BID FORM & ATTACHMENTS

# **BID FORM CONT.**

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within <u>100</u> calendar days of the Notice to Proceed.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am / We are an Individual / a Partnership / a Corporation

| By  | Trading as             |  |  |  |
|---|------------------------|--|--|--|
| (Individual's / General Partner's / Corporate Name) | _ Trading as           |  |  |  |
| (State of Corporation)                              | _                      |  |  |  |
| Business Address:                                   |                        |  |  |  |
|   |                        |  |  |  |
|   |                        |  |  |  |
| Witness:  | Bv:                    |  |  |  |
| Witness:  | (Authorized Signature) |  |  |  |
|   | (Title)                |  |  |  |
|   | Date:                  |  |  |  |
|   |                        |  |  |  |
| ATTACHMENTS<br>Subcontractor List                   |                        |  |  |  |
| Non-Collusion Statement<br>Bid Bond                 |                        |  |  |  |
| Consent of Surety                                   |                        |  |  |  |

# SUBCONTRACTOR LIST TO ACCOMPANY BID FORM

In accordance with Title 29, Chapter 6962 (d)(10)b <u>Delaware Code</u>, the following sub-contractor listing must accompany the bid submittal. The name and address of the sub-contractor **must be listed for each category** where the bidder intends to use a sub-contractor to perform that category of work. In order to provide full disclosure and acceptance of the bid by the *Owner*, **it is required that bidders list themselves as being the sub-contractor for all categories where he/she is qualified and intends to perform such work.** 

Subcontractor Category

Subcontractor

Address (City & State)

1. ATC

2. ATC – Alternate #1

# NON-COLLUSION STATEMENT TO ACCOMPANY BID FORM

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date to the DTCC Department of Administrative Services, Delaware Technical Community College, Stanton Campus, 400 Stanton-Christiana Road, Newark, DE 19713.

All the terms and conditions of DTCC-EWINGRENO have been thoroughly examined and are understood.

| NAME OF BIDDER:                           |               |    |
|---|---------------|----|
| AUTHORIZED REPRESENTATIVE (TYPED):        |               |    |
| AUTHORIZED REPRESENTATIVE<br>(SIGNATURE): |               |    |
| TITLE:                                    |               |    |
| ADDRESS OF BIDDER:                        |               |    |
|   |               |    |
| PHONE NUMBER:                             |               |    |
| Sworn to and Subscribed before me this    | day of        | 20 |
| My Commission expires                     | NOTARY PUBLIC |    |

#### THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

# **BID BOND**

TO ACCOMPANY BID FORM

(Not necessary if security is used)

KNOW ALL MEN BY THESE PRESENTS That:

| of  |                                    |                  | in the County of                                | and State of<br>ofas <b>Surety</b> , legally authorized to do business in the State  |     |
|---|------------------------------------|------------------|---|--|-----|
| as <b>Principal</b> , and                     |                                    |                  |   | of   |     |
| in the County of                              |                                    | and State of     |   | _ as Surety, legally authorized to do business in the State  | of  |
| Delaware ("State"), a                         | are held and fir                   | mly unto the St  | tate in the sum of                              | not to exceed) of amount of bid on Contract No   |     |
| Dollars (\$                                   |                                    | ), or            | percent   | not to exceed  |     |
|   |                                    | Dolla            | rs (\$  | ) of amount of bid on Contract No.   |     |
| , to be paid t                                | o the State for                    | the use and be   | nefit of  | Delaware Technical<br>lo bind ourselves, our and each of our heirs, executors,   | l   |
| Community College f<br>administrators, and su | for which payn<br>accessors, joint | nent well and tr | uly to be made, we or<br>y for and in the whole | to bind ourselves, our and each of our heirs, executors, the firmly by these presents.                                       |     |
| NOW THE                                       |                                    |                  |   | That if the above bonded <b>Principal</b> who has submitted to<br>munity College a certain proposal to enter into this contr |     |
| truly enter into and ex                       | kecute this Cor                    | tract as may be  | required by the terr                            | l be awarded this Contract, and if said <b>Principal</b> shall we<br>ns of this Contract and approved by the                 |     |
|   | otice of the awa                   | ard thereof in a |   | erms of said proposal, then this obligation shall be void  |     |
| Sealed with                                   | seal and (20                       | dated this).     | day ofin the year of our Lord two thou          |  | and |
| SEALED, AND DEL                               | IVERED IN T<br>Presence            |                  |   |  |     |
|   |                                    |                  |   | Name of Bidder (Organization)  |     |
|   | rporate<br>Seal                    | By:              |   | Authorized Signature   |     |
| Attest  |                                    |                  |   |  |     |
|   |                                    |                  |   | Title  |     |
|   |                                    |                  |   | Name of Surety   |     |
| Witness:                                      |                                    | By:              |   |  |     |
|   |                                    |                  |   | Title  |     |

# CONSENT OF SURETY TO ACCOMPANY BID FORM

DATE\_\_\_\_\_

 TO: Delaware Technical Community College - Stanton DTCC Department of Administrative Services 400 Stanton-Christiana Road Newark, DE 19713

Gentlemen:

We, the \_\_\_\_\_

(Surety Company)

(Surety Company's Address)

a Surety Company authorized to do business in the State of Delaware hereby agrees that if \_\_\_\_\_

(Contractor)

(Contractor's Address)

is awarded the Contract for DTCC13345-CWINGADD. We will write the required Performance and/or Labor and Material Bond required by the Instructions to Bidders.

(Surety Company)

By

(Attorney-in-Fact)

# 1. SAFETY

- 1.1 Safety Requirements
- 1.2 Safety Program
- 1.3 Safety Orientation
- 1.4 Safety Training
- 1.5 Protective Clothing
- 1.6 Respiratory Equipment
- 1.7 Barricades
- 1.8 Construction Equipment
- 1.9 Access
- 1.10 Spray Painting
- 1.11 Ladders
- 1.12 Scaffolds
- 1.13 Fall Protection
- 1.14 Ground Fault Protection
- 1.15 Gas Cylinders
- 1.16 Tool Inspection
- 1.17 Projecting Materials
- 1.18 Personnel in Pipe Bridges
- 1.19 Danger Tag, Lock, and Try Procedure / Electrical Safety
- 1.20 Safety Violations
- 1.21 Reporting Injuries
- 1.22 Hazard Communication
- 1.23 Non-Asbestos Respirable Fibers
- 2. FIRE PROTECTION
  - 2.1 Procedure
  - 2.2 Smoking
  - 2.3 Flammable Materials
  - 2.4 Fire Extinguishers
  - 2.5 Oily Rag Storage
  - 2.6 Protective Structures
  - 2.7 Burning and Welding Equipment
  - 2.8 Powered Equipment

# 3. CONSTRUCTION FACILITIES

- 3.1 Identification
- 3.2 Parking
- 3.3 Site Access
- 3.4 Contractor Vehicles
- 3.5 Telephone
- 3.6 Drinking Water and Sanitary Facilities
- 3.7 Water
- 3.8 Electric Power
- 3.9 Compressed Air
- 3.10 Project Facilities
- 3.11 Smoking

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## 1. SAFETY

The special safety requirements listed herein shall not relieve Contractor from complying with the Occupational Safety and Health Act (OSHA) or any other contractual agreement, and are only noted to highlight potential problem areas.

### 1.1 Safety Requirements

Contractor shall comply and perform work in strict accordance to the latest OSHA standards and guidelines and any requirements stated herein.

### 1.2 Safety Program

After contract award, and before starting work, Contractor shall submit, for Bancroft's review and acceptance, a written safety program that all Contractors' employees must follow while on the job site. Minimum acceptable program shall meet OSHA requirements.

### 1.3 Safety Orientation

a. Contractor is to give a project / site specific Safety Orientation to each contract employee on the first day on the job site. The contractor is not relieved of responsibility for providing safety training to employees or subcontractors performing work that may be required by OSHA for work defined in the contract documents.

### 1.4 Safety Training

Contractor's job supervisor shall ensure that personnel are trained and properly supervised in performing work that they are assigned. Contractor and subcontractor shall hold a 10-15 minute safety meeting (Toolbox Talk) for it's personnel each week and document the subject matter and attendees for forwarding to Bancroft on a weekly basis.

### 1.5 Protective Clothing

Contractor's personnel shall wear hard hats, industrial quality shoes, and safety glasses with side shields.

Safety glasses, including all components (frames, lenses, and side shields) shall conform to ANSI Standard Z87.1.

Impact resistant visitor spectacles, conforming to ANSI Standard Z87.1, worn over prescription glasses will be permitted only on an interim basis until personnel are furnished safety glasses as specified above. Visitor spectacles shall not be used as an ongoing substitute for safety glasses.

Face shields and welding visors shall be of types which attach to the hard hat.

Gloves suitable for the job being performed shall be worn in accordance to the latest OSHA regulations.

### 1.6 Respiratory Equipment

Before any employee starts work requiring use of respiratory protective equipment, Contractor shall furnish Bancroft proof of compliance with OSHA Sections 1926.103 and 1910.134, including the following documentation:

- 1.6.1 Physician's approval for the employee to use respiratory protective equipment. Training records indicating each type of respirator the employee is trained to use. Fit test records for each type of respirator the employee is qualified to use.
- 1.6.2 Before starting any asbestos (insulation, transite, etc.) work or excavation requiring respiratory protective equipment to be used or available for emergency use, Contractor shall provide services to qualify and train, in accordance with OSHA Section 1926.103, each employee Contractor intends to employ on such work.
- 1.6.3 Contractor shall furnish emergency rescue respirators required for work inside a vessel or confined space (closed chamber). Respirators shall be self-contained breathing apparatus (SCBA) or, if the vessel opening is too small for easy entry and exit, a full face airline respirator with escape cylinder.

### 1.7 Barricades

Contractor shall furnish, erect, maintain, and dismantle all barricades required for its work.

Barricades are required:

- Around all work areas.
- Around crane swing area. Barricades may be tape and stand variety. Post overhead work signs.
- To define outer limits of high noise areas. Post appropriate signs.
- To define areas of overhead work. Post overhead work signs.
- Around excavations. Post appropriate signs & provide wood or plastic snow fencing.
- Road closures Install barricades, signage, and manage traffic as required to assure safety of pedestrians and operations of owner / project facility. Traffic / Road interruptions have to be scheduled one week prior to scheduled work. All roads and driveways currently in operation are to remain uninterrupted during normal work hours unless permitted otherwise.
- Protective (rigid) barricades Shall consist of guardrail and midrail meeting OSHA definition of "standard railing" {OSHA Section 1926.500(f)}, capable of supporting a 200 pound force in any direction with minimal deflection of 3" in any direction. Protective barricades are required:
- Around excavations
- Around floor openings
- At floor and roof edges
- At elevated wall openings
- 1.8 Construction Equipment
  - 1.8.1 Contractor is to inspect the condition of all equipment at the beginning of each work shift. Equipment missing guards, safety features, or otherwise in poor condition are to be repaired or replaced.

#### 1.8.2 Major Equipment

a. Cranes, forklifts, trucks, and similar construction equipment shall not be left unattended unless shutdown and secured to prevent unintentional movement.

b. All vehicles, except those primarily configured for passengers (e.g., cars, station wagons, vans, and light duty pick-up trucks) must have the engine turned off, the parking brake set, the transmission in gear or "park", and a wheel adequately chocked in opposite directions, when parked and unattended. "Adequately" means sized appropriately for the vehicle and load. "Unattended" means with no one in the cab or in a position to have complete control over vehicular motion, and is intended to apply primarily to delivery vehicles and concrete trucks. A running engine will be permitted where necessary for an auxiliary power source, provided the other requirements noted above are met.

c. Semi-trailers to be loaded or unloaded with the tractor disconnected and shall have a wheel chocked in opposite directions and a support jack installed under the tractor connection plate (fifth wheel).

d. Contractor shall furnish chocks for subcontractors, suppliers, and material deliveries arriving at the site without their own chocks.

- 1.8.3 Truck-mounted, hydraulic, telescoping boom cranes shall not be moved until the boom is fully retracted and lowered into the boom cradle, if provided, and the hook is secured in a tie-down lug at some point on the truck bed.
- 1.8.4 a. Modifications shall not be made to lifting equipment without the manufacturer's written permission. Each custom designed, job made lifting accessory (e.g., grabs, hooks, clamps, etc.) shall be marked to indicate the safe working load and shall be tested, prior to use, to 125 percent of its rated load. {Reference OSHA Section 1926.251(a)(4)}.

b. Rigging from the buckets or booms of backhoes, front-end loaders, bulldozers, etc., to lay pipe, erect steel, pick and carry, etc., will not be permitted unless a properly installed and tested lifting eye or lug has been attached to the bucket or boom by the manufacturer, and lifting capacities and configurations are specified in the manufacturer's operating manual.

- 1.8.5 All earth moving and hauling equipment, and any vehicle or construction equipment shall be equipped with audible backup alarms.
- 1.8.6 The use of a crane or derrick to hoist employees on a personnel platform is prohibited; except when the erection, use, and dismantling of conventional means of reaching the work site, such as a personnel hoist, ladder stairway, aerial lift, elevating work platform or scaffold, would be more hazardous or is not possible because of structural design or work site conditions.
- 1.8.7 Anti-two-block devices are required when using a hydraulic crane.
- 1.8.8 Access to, and egress from, crane cabs, material wagons, truck beds, crawler backhoes, etc., shall be achieved by built-in ladder and/or hand holds provided by the equipment

manufacturer. If such means are not provided, Contractor shall provide a properly positioned and secured ladder or other approved method.

- 1.8.9 Contractor shall comply with the following requirements for aerial work platforms, man lifts, or bucket trucks:
  - Operator shall be trained at Contractor's expense.
  - Personnel shall use safety harnesses with the lanyard secured to the platform or boom.
  - Personnel shall perform their work while standing on the platform floor. Standing on the top rail, midrail, or toeboard will not be permitted.
  - Before equipment travel, the boom must be fully retracted and lowered to the horizontal position.
  - Rigging from the platform or boom will not be permitted.
  - Climbing out of the platform will not be permitted.
  - Climbing out of the platform to an elevated work location will not be permitted.
- 1.8.10 a. No one shall be permitted to operate a lifting device (material or personnel) unless they have been properly trained.
  - b. The manufacturer's operating instructions shall accompany the device.
- 1.8.11 Cranes shall be restricted to 75% of the capacity shown on the manufacturer's capacity chart when operating in the stability or tipping portion of the chart. When operating in the structural integrity area of the chart, the capacity shown on the chart is acceptable. Crane inspection records must be readily available and kept within the crane.
- 1.8.13 Lifts over occupied buildings shall be made with the approval of Bancroft's construction representative. Lift Plans will be required and must be submitted to Bancroft Construction Company no less than five (5) working days prior to the intended lift. The area within the boom swing radius shall be evacuated and barricaded. This is the responsibility of the contractor making the lift.
- 1.8.14 Noisy equipment, such as pavement breakers, high speed saws, etc., required in performance of the work, shall be checked and cleared 24 hours prior to use with Bancroft's construction representative.
- 1.9 Access

Access to exit doors, electric or elevator panels, and fire extinguishers or other emergency equipment must not be blocked at any time.

1.10 Spray Painting

During spray painting operations where a hazardous warning is posted on the paint can label and controls are inadequate to prevent harmful exposure to employees, Contractor shall provide, at no additional cost to Bancroft, and require its employees to use, respirators approved for spray painting operations, and shall comply with OSHA Sections 1926.103 and 1910.134.

1.11 Ladders

Contractor's qualified person shall inspect all ladders brought onto the job site. The user before each use shall visually inspect ladders. Defective ladders shall be promptly removed from the site. Ladders without required labels shall not be used.

Folding (Trestle Type) ladders are not permitted.

When working from stepladders or extension ladders the following will be enforced:

- Straight and Extension ladders will be tied off where possible.
- Persons working on ladders shall not overreach a comfortable working area. (Rule of thumb is the belt buckle is not to be outside of the rails).
- Where extension ladders cannot be tied off an assistant will be required to support the base.
- When working from, ascending or descending the user shall face the ladder.
- Employees shall face the ladder when working from, ascending /descending and at least one hand will be used to grasp the ladder.
- Each employee shall use at least one hand to grasp the ladder when progressing up or down the ladder.
- An employee shall not carry any object or load that could cause the employee to lose balance and fall when ascending/descending a ladder.
- Metal ladders are prohibited.
- Extension Ladders
  - Extension ladders shall not exceed 36' in length when fully extended. The minimum overlap of the sections shall be 3'.
  - Extension ladders used to gain access to elevated areas shall extend a minimum of 3' above the point of access /egress.
- Stepladders
  - Stepladders over 12' will be required to be tied off or have an assistant to support the base.
  - The top rung and the top of the stepladder shall not be used.
  - Sitting on the top or straddling the ladder is prohibited.
  - Stepladders shall not be used in the closed position.
- 1.12 Scaffolds

Scaffolds shall comply with OSHA requirements, <u>and</u> the requirements listed herein. Contractor is to provide a Competent Person to inspect and tag scaffolding before use. Scaffolding that is not properly tagged will not be permitted for use.

Where guardrails cannot be installed due to overhead obstructions etc., employees will utilize personal fall arrest equipment.

All scaffolds **<u>will be tagged</u>** by the competent person identifying the scaffold to be complete or incomplete and what if any, additional measures must be met to work from the scaffold safely.

During erection/dismantlement of scaffolds, the competent person will determine the feasibility and safety of providing fall protection for employee's erecting/dismantling scaffolds.

- Employers are required to provide fall protection for employees erecting/dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.
- If the Competent person determines providing fall protection creates a greater hazard, he/she must submit this in writing and be identified as the "Competent Person".

### 1.13 Fall Protection

- 1.13.1 Protection is required to prevent personnel or material from falling through floor openings, wall openings, or from roof edges, stairways, elevator shafts, etc. The protection shall comply with the requirements of OSHA
- 1.13.2 Contractor shall provide a workable fall prevention and/or protection system (horizontal lifelines, retractable lifelines, nets, etc.) for all employees exposed to a potential fall.
- 1.13.3 Personnel erecting, connecting or bolting up structural steel shall comply with the latest OSHA Steel Erection Standards.
- 1.14 Ground Fault Protection

Contractor shall provide ground fault circuit interrupter protection for all cord sets, receptacles, and electrical tools and equipment connected by cord and plug which are used or available for use by employees. Ground Fault protection shall be in usable condition with not apparent defects and shall be tested prior to the beginning of each shift.

1.15 Gas Cylinders

Compressed gas cylinders shall be properly secured on two-wheel hand trucks designed for this use. Compressed gas cylinders shall not be brought into buildings. Unless individual cylinders are equipped with regulating devices, they shall have the safety cap secured in place. All cylinders shall be maintained in the upright position and secured with a noncombustible material.

All burning rigs shall be broken down with regulators removed and protective caps screwed down hand tight at the end of each shift.

1.16 Tool Inspection

All Contractor-furnished portable tools and equipment (including personal protective equipment) shall be maintained in safe working order and are subject to Bancroft's inspection at any time while on the plant site. Bancroft retains the right to prohibit, or restrict, the use of tools and equipment determined to be in unsafe working condition.

### 1.17 Projecting Materials

Reinforcing steel or similar material projecting above horizontal surfaces shall be capped or otherwise protected to prevent the possibility of impaling personnel per OSHA standards. The contractor installing the projecting material(s) will be responsible for capping and/or making safe the hazard and the maintenance of the system.

### 1.18 Personnel in Pipe Bridges

Contractor shall provide means of access and egress adjacent to the work area for personnel working in pipe bridges. Walking on, crawling along, sitting on, or working from pipe or cable trays will not be permitted.

### 1.19 Danger Tag, Lock, and Try Procedure / Electrical Safety

Contractor shall strictly follow OSHA/NEC regulations and recommendations for lock, tag and try procedures before starting work on any process or electrical systems, which can be actuated.

All electrical installation is to be done in accordance to NFPA 70E. Any and all 'hot work' is to be avoided when and where possible. Work will not be allowed on energized systems until all other options and alternatives have been investigated.

All installation and renovation work on power distribution systems operating at 480 volts or higher require both phase to phase and phase to ground megger testing to be performed. The results of the megger tests are to be written on the Daily Activity Report submitted to Bancroft.

All installation or renovation work performed on power distribution system operating at 480 volts or higher will require a complete written and approved job plan. If any part of the job plan cannot be performed as written or if anything changes from the original job plan, work shall stop until a new job plan can be written and approved. All persons that participated in the original job plan shall be part of writing and approving the new job plan.

### 1.20 Safety Violations

Employees who repeatedly violate safety requirements will be denied access to the job site. In the event of OSHA violations or unsafe practices involving imminent danger to, Bancroft, other sub-contractors, or contractor personnel, immediate action shall be taken to stop work and correct the hazardous situation. If violations continue or corrective actions are not taken after a reasonable period of time, Bancroft's will notify the school district and recommend terminating the contract in accordance with the General Conditions.

### 1.21 Reporting Injuries

- 1.21.1 Contractor shall immediately notify Bancroft of any injury or potentially serious hazard to personnel on the site. Each injury or incident shall be jointly investigated by Contractor's site supervisor and Bancroft's construction representative. Contractor shall submit a detailed report to Bancroft within 24 hours of the injury or incident.
- 1.21.2 The incident/injury report should contain all, but not limited to, the following items: Location of Incident, Date of Incident, Time of Incident, Did incident produce injury?, Description of Incident, Direct cause of incidents and corrective actions, Name of Contractor(s), Contractor Trade Type, Injury/Illness Classification, Illness? Medically Treated?, How long did the injured work on the Project, how many years of experience in Craft does the injured have, and name of the person submitting the report.
- 1.21.3 If any contractor personnel are injured, and require off-site treatment, the results of the treatment is to be reported to Bancroft. Contractor's supervisor or foreman shall be available to provide information for development of an injury report.

### 1.22 Hazard Communication

Contractor and all tier subcontractors shall comply with OSHA Hazard Communication Standard 1910.1200 and all applicable state and local hazard communication requirements, which includes:

- Developing and implementing a written hazard communication program for the site. Provide a copy to Bancroft.
- Training its employees in handling all hazardous materials.
- Maintaining a list of all hazardous materials present in the workplace and posting it in a place accessible to all employees. Material Safety Data Sheets must be on file for each such material. A copy of all MSDS (Material Safety Data Sheets) must be submitted to Bancroft prior to start of work.
- Providing Bancroft the quantity of each hazardous material brought on site.
- Providing copies of the list of hazardous materials and the Material Safety Data Sheets to state and local officials as required.

Contractor shall obtain Bancroft's approval before introducing any hazardous materials onto project / site property. Such materials shall be properly labeled and strictly controlled. Storage and use must comply with the Material Safety Data Sheets.

The Owner will be responsible for forwarding or notifying Bancroft and any sub-contractors of hazards due to owner operations, material, or equipment.

1.23 Non-Asbestos Respirable Fibers

All installation and removal involving materials containing any Non-Asbestos respirable fibers (NARF'S) such as, Fiberglass wool, mineral wool, para-aramid pulp or staple, carbon fibers and most synthetic organic fibers, may require the following minimum work practices as indicated on the MSDS sheets.

- 1. representative air monitoring
- 2. personal protective equipment
- 3. HEPA vacuum/wet method cleaning...no sweeping or blowing
- 4. training, particularly on health hazards
- 5. Double-Bagged (6 mil thickness) & labeled (CM to supply labels)
- 6. disposed of in an asbestos approved landfill

Contractor shall obtain through the CM approval before introducing any hazardous materials onto project / site property. Such materials shall be properly labeled and strictly controlled. Storage and use must comply with the Material Safety Data Sheets.

Owner will notify the CM, who will in turn notify all Contractors, of hazards due to owner operations or facilities.

### 2. FIRE PROTECTION

2.1 Procedures

Contractor shall observe owners fire, fume release, and disaster procedures. Contractor's job supervisor shall become familiar with the alarm and evacuation procedures and shall ensure that all Contractors' employees are thoroughly familiar with those procedures.

2.2 Smoking

Smoking will be permitted only in areas designated by Bancroft. Contractor shall furnish butt cans and fire extinguishers in such areas.

Smoking by a contractor employee in any non-designated area shall be considered cause to require Contractor to remove that employee from the project site.

2.3 Flammable Materials

Storage and use of flammable materials will be subject to Bancroft's approval. OSHA-approved safety cabinets and cans shall be used for storing and dispensing flammable liquids and must have prior Bancroft approval. Gasoline powered tools or equipment are not permitted inside buildings.

2.4 Fire Extinguishers

Contractor shall furnish a minimum 10-pound fire extinguisher where required for the performance of their work. The extinguishers shall be rated not less than 2A:40-BC and be maintained for the duration of the work. Discharged extinguishers shall be recharged or replaced as necessary. Extinguishers shall be inspected monthly. The name of the inspector and the date inspected must be entered on the extinguisher inspection tag.

- 2.5 Oil Rag Storage
  - 2.5.1 Dirty and oily rags shall be kept in fire proof metal containers with self-closing lids and removed from premises daily.
  - 2.5.2 Oil Catch Pans

Oil catch pans placed under pipe and conduit threading machines must be noncombustible: i.e., metal and filled with nonflammable absorbent material.

2.6 Protective Structures

Any plastic, tarpaulin, or other material used to construct a hut, tent, or similar protective structure, shall be flame retardant.

2.7 Burning and Welding Equipment

All oxy-fuel burning and welding units shall be equipped with a combination flashback arrestor and check valve between the torch and the hoses.

All users of oxy-fuel burning and welding equipment shall be trained in safe operating techniques.

Electrical service will not be available for electric welders. Welders must be gasoline or diesel powered and positioned outside the building away from fresh air intakes.

2.8 Powered Equipment

No gasoline or propane equipment is permitted in Buildings. All equipment to be air or electric operated. Contractor is to provide air source and electric source in excess of 120 Volt, 15 Amp.

### 3. CONSTRUCTION FACILITIES

3.1 Identification

Contractors are not allowed to post a sign or banner on site without approval from Bancroft. Signage and postings are to be discouraged as it detracts from appearance of owner property.

3.2 Parking

Contractor's employees shall park in construction parking as designated by Bancroft's construction representative.

- 3.3 Site Access
  - a. Working hours: See the Special Conditions / Schedule Specification.
  - b. All construction traffic (personnel, material deliveries, vendors) are to enter the site from the entrance / exit identified by Bancroft. Construction equipment and deliveries are to be received by contractor personnel and during normal work hours. Contractor to properly store and secure all material and equipment and not rely on Bancroft to secure material and equipment on their behalf
  - c. Field Office trailers may be allowed on site dependent on Bancroft approval.
  - d. Designated routes will be established for access to the work area and for movement of material and equipment. Movement of material and equipment shall be scheduled with Bancroft. Contractors are to understand the project site, site limitations, and the Phasing Plan and the limitations of men and material deliveries and traffic patterns for the duration of the project. Contractor personnel will not be allowed to leave designated work areas or paths of travel with the exception of an emergency. Contract personnel found outside the designated construction area without prior approval will be asked to leave the work site at Bancroft's discretion.
  - d. Only the Bancroft construction representative can authorize vehicles in the work area.
- 3.4 Contractor Vehicles

Amount of vehicles shall be kept in designated work / parking areas.

3.5 Telephone : None provided. All job foreman / on-site supervision will be required to have a mobile phone.

3.6 Drinking Water and Sanitary Facilities

Drinking water is available within the school. Sanitary facilities will be the responsibility of the Bancroft.

3.7 Water

Water for construction is available from the closest existing hose bib or water source in the existing building(s). The contractor has the responsibility in getting the water from the existing source to his place of work.

Fire hydrants shall not be used as a source of water without Bancroft's prior written approval.

3.8 Electric Power

Temporary power in the building(s) will be provided within the building. Temporary power will be provided by the electrical contractor. Temporary power provided will be limited to 120V service. Requirements above 115 volt/ 20 Amperes will have to be supplied by each respective contractor.

3.9 Compressed Air

Compressed air is not available in the work area. Contractor shall provide its own source of compressed air.

3.10 Owner Facilities

Contractor's personnel will not be permitted to use owner facilities such as lunchroom, change areas, or toilets unless previously arranged with the Bancroft representative.

3.11 Smoking

Smoking will be permitted in designated areas only. Smoking will not be permitted in temporary facilities, such as construction or field office trailers.

### 4. HOUSEKEEPING

### 4.1 Clean Up

Contractor shall take all necessary precautions to prevent dirt, dust, etc., from entering operating areas. Occupied areas during construction must be protected from all work that will produce dust. Erect (6) mil plastic walls with sealed top and bottom plates to contain dust in work area. Remove upon completion of the work.

During the course of construction, alteration, or repairs, all debris shall be kept cleared from work areas, passageways, and stairs in and around buildings or other structures.

Contractor shall clean up all work areas. Debris and scrap material will not be allowed to accumulate in any work area. As work progresses the area is to be kept clean at all times during the day - vacuum all dust as necessary. Contractor shall containerize all scrap materials and waste on a daily basis.

### SITE CONDITIONS

Should Contractor fail to keep its work areas orderly, Bancroft will perform this work on a timeand-material basis and back-charge Contractor.

### 4.2 Waste Material Control

Bancroft will provide dumpsters for general debris for new construction (refer to CWM & Disposal Spec). It will be the responsibility of each respective contractor to remove the debris from the work area to the dumpster location on a regular basis to maintain a clean and safe work site.

Contractor shall ensure that its operations comply with the oil spill prevention provisions of 40 CFR. 112. Further, the spillage of oil or any other foreign substance onto the ground or into plant sumps, trenches or ditches is strictly prohibited.

### 4.3 Road Maintenance

Contractor shall maintain roads and other site operating areas affected by its operations in a clean and uncluttered condition at all times. Any dirt, mud, concrete, debris, spoil, refuse, etc., shall be cleaned up and removed immediately.

4.4 Spill Notification and Protection

Contractor shall contain spills immediately and notify the Bancroft site representative as soon as possible.

Contractor shall maintain filter media around all storm drains prior to commencement of work in areas adjacent to drains.

4.5 Roof Protection

Contractor is required to provide necessary measures to protect adjacent roofing areas from damage due to contractor's activities. Provide protection to roofs to avoid damage from sharp objects, debris, foot traffic, and material lay down, etc. Also provide proper housekeeping to avoid reliance on protection to keep roof intact. Inspect and report condition on a weekly basis.

### 5. WORKING CONDITIONS

5.1 Testing for Substance Abuse

Not used.

5.2 Manpower Accountability

Within one hour of commencement of each shift, the contractor shall furnish Bancroft Construction Company with a count of manpower on site.

### 5.3 Visitor Control

All visitors shall be escorted by Contractor's site supervision, and are to wear required PPE.

### 5.4 Coordination with Others

Where Contractor's work must be performed in conjunction with others, Contractor shall cooperate with Bancroft in scheduling, coordinating, and sequencing its work with that of others so all work may proceed with minimal interference or delay.

### 5.5 Co-Occupancy

Contractor shall provide all measures required to protect existing facilities and work performed by others from damage due to Contractor's (including its tier subcontractors) operations or negligence. Bancroft may direct or suspend Contractor's operation until such protective measures are provided, and the cost for stand-by of Contractor's, its tier subcontractor's, or other contractor's men and equipment shall be born by the responsible Contractor.

### 5.6 Permits

- 5.6.1 Trade permits will be as required by governing agencies and provided by contractor at his expense.
- 5.6.2 Not used.
- 5.6.3 Vessel or confined space entry permits will be required daily for any work inside a vessel or confined space (i.e., any area which must be entered through a restricted opening, such as tanks, vessels, ductwork, vessel skirts, manholes, etc.). Contractor shall comply with the OSHA's danger tag, lock, and try procedure. Contractor shall fill out the necessary permit forms and submit them sufficiently in advance to allow all required approvals to be obtained before work in the vessel or confined space is scheduled to start. Contractor shall furnish all protective and emergency equipment, and atmospheric testing equipment. Continuous monitoring equipment shall have audible alarms. Contractor shall utilize personnel who have been trained to operate the equipment.
- 5.6.4 Contractor shall hand excavate to locate all identified underground services before any mechanical excavating equipment will be permitted to be used. Contractor shall be responsible for contacting Miss Utility and obtaining clearances for digging and excavations.

### 5.6.5 Not used

- 5.6.6 Cutting and Patching
  - 5.6.6.1 Contractor is responsible for cutting and patching of any penetrations for his work, and the weather tightness of these penetration(s) unless otherwise noted. Work to be performed by qualified personnel including coordination with manufacturer of roof so existing warranties are not disrupted.
  - 5.6.6.2 Cutting and patching of existing walls that are penetrated in the horizontal direction (perpendicular to wall). This includes patching of wall between the O.D. of the sleeve and the opening in the wall and sealing between the O.D. of the mechanical or electrical service and the ID of the sleeve.
  - 5.6.6.3 All penetrations through fire walls or other walls that extend to the underside of the decking shall be sealed to maintain fire rating and to prevent cross contamination between spaces. Sealant to be as specified or an approved equal.
- 5.7 Material Shipment and Storage

### SITE CONDITIONS

- 5.7.1 Interior staging area will be limited. During the project duration, it is anticipated that staging areas will have to be relocated to facilitate demolition and renovation work. Contractor will respond accordingly at no additional cost to Bancroft.
- 5.7.2 Limited exterior staging lay down area is available. Bancroft to coordinate and administer the project site for the good of the project.
- 5.7.3 Material being furnished by Bancroft, another sub-contractor, or Owner (if noted in Summary of Work) will be made available to Contractor at the job site. Contractor to assume receipt of material(s) and assume responsibility including, storage, protection, and installation until accepted by the owner.
- 5.8 Prohibited Items

Radios, and tape recorders are strictly prohibited at job site. Food, beverages, and chewing tobacco shall not be consumed in the work area.

5.9 Tool and Equipment Control

Bancroft will not be responsible for the loss or theft, either on or in the site, in the parking lot, or in the staging areas, of Contractor's tools or equipment, or Contractor employees' personal belongings.

5.10 Excavation Requirements

Twenty-four (24) hours before Contractor personnel first enter any excavation, trench, hole, etc., over five (5) feet deep, Contractors competent person will inspect the side slopes, shoring, or sheeting for compliance with OSHA Section 1926.652. Contractor shall correct all noted discrepancies before allowing work to continue.

Contractor shall comply with OSHA 1926.652 "Competent Person" - This designated person shall be present at all times during the excavating process.

5.11 Sexual Harassment - Bancroft Policy

Everyone is entitled to a work environment free from sexual, racial or other distasteful discrimination. Contractor shall insure that no one will be discriminated against in the workplace. Disrespect for any employee, sexual harassment, offensive or insulting behavior is considered unacceptable and may result in termination.

END OF SECTION 005000



## **GENERAL CONDITIONS**

STANDARD

### **GENERAL CONDITIONS**

### OF THE

### CONSTRUCTION CONTRACT

The General Conditions of this Contract are as stated in the American Institute of Architects Document AIA A201 (2007 Edition) entitled <u>General Conditions of the Contract for Construction</u> and is part of this project manual as if herein written in full.

Copies of the Document are available through the Owner.

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- Q. FIRST DELIVERY OF MATERIAL/EQUIPMENT INSPECTION
- R. MOCK UP
- S. IN WALL AND ABOVE CEILING ACCEPTANCE

### A. BIDDING – CONTRACT DOCUMENTS

The Summary of Work, drawings and specifications are intended to be complementary and should therefore be reviewed together to obtain a complete understanding of the contract requirements. Anything not shown on the drawings but mentioned in the specifications or vice versa, and anything not expressly set forth in either but which can be reasonably inferred as necessary for completion of the work described herein, shall be furnished and installed by Contractor the same as if mentioned in both. Bancroft Construction will not directly perform/install any Work or supply any material or equipment unless noted as such in the Summary of Work. Any reference in the plans or specifications to work performed by 'G.C.' to be performed by the appropriate or delegated sub-contractor.

- 1. Each bidder is responsible for confirming that all documents, drawings, specifications, etc. defined as contract documents are included during reproduction and are legible. Request for compensation after contract award for drawings/documents that were missing, illegible will not be recognized or acknowledged. Please confirm that all the drawings and specifications are included in your package.
- 2. Questions related to design, drawings, specifications, etc., which arise subsequent to contract award shall be submitted using Bancroft's construction management website Prolog Web by Contractor to Bancroft's designated representative who will respond to Contractor within (10) calendar days after receiving Contractor's Request For Information (RFI). These RFI's are to be submitted in a timely manner such that they do not interfere with the sequence of planned or scheduled work.
- 3. The organization of the specifications into divisions and sections, and the arrangement of the drawings shall not control Contractor in dividing the work among subcontractors or in establishing the extent of work to be performed by any craft.
- 4. Insurance certificates, evidencing the insurance coverage's described in the Project Manual and in Bancroft's General Conditions, must be filed with Bancroft, including certificates for any and all subtier contractors before starting work for this contract. This insurance must be maintained throughout the duration of the project and for one year thereafter.

### **B. WORK HOURS & HOLIDAYS**

The Project holidays that are within or near the contract schedule are as follows:

- a) November 27, 2014, Thanksgiving
- b) December 25, 2014, Christmas
- c) January 1, 2014, New Year's

The Site will not be accessible for work on these days. The contractor shall make the necessary arrangements for his employees.

Work shifts and work hours are subject to mutual approved schedules and contractual adjustments.

Bancroft Construction is to be notified in writing (3) days in advance of planned work schedules and shifts outside a designated phase. If the contract duration is extended or warranty work is to be performed, work is to be performed during off-hours.

### C. CONTRACT ADJUSTMENTS

Contract adjustments, changes, and all work outside the contract is to be performed as authorized by Bancroft's representative(s). Execution of extra work without prior authorization will be at the contractor's risk. Requests for Proposal (RFP) issued by Bancroft are to be returned in timely manner as identified in the each request. Contractor delays in returning proposal as requested will not be taken into account when assessing any adjustments in contract time.

At the Owners discretion/option, changes or additional work to the contract scope, which are requested, directed and/or agreed upon by all parties, may occur and be handled in the following manner:

**Lump Sum-** For which the contractor will provide complete documentation, including estimate sheets reflecting the cost of labor, material, equipment, taxes, insurance, overhead and profit to support the proposal. The overhead and profit that will be added to all change orders will be limited to 5% (1.05 Multiplier).

Mark-up on subcontractor negotiated lump sum change orders will be limited to 5% (1.05 Multiplier).

**Unit Price**- The unit prices represent comprehensive pricing for a unit associated with an indefinite quantity within in a set range for the purpose of a contract adjustment. The work contracted and performed through unit prices is to become part of the contract and performed under the same terms and conditions. The unit price is inclusive of all material, labor, incidental expenses, overhead, profits, fees or any other associated expense in performing the work. The Owner is not obligated to the unit prices and at their discretion, may use either a lump sum, or a time &material method to issue a contract adjustment

**Time & Material Work**: Per Bancroft's/Owners authorization, perform time & material work based on the labor prices determined as part of this contract including attached vouchers, invoices, and/or bill of materials to support the request. Time & Material-Items for which the contractor will be reimbursed:

Time sheets submitted to support invoices for changes or additional work performed on a timeand-material basis shall include, as a minimum:

- a) Employee's full name
- b) Craft and level (apprentice, journeyman, foreman, etc.)
- c) Straight time hours worked
- d) Overtime hours worked
- e) Description of work
- f) Materials used
- g) Potential Change Order (PCO) Number / Identification Number
- Time sheets must be signed by Contractor's and the Bancroft's site representatives by the end of the following work day to be considered valid. Time-and-Material hourly rates are to be submitted in accordance to the Project Manual and included in sub-contract agreement. Time-and-Material work and rates are to include the following:
  - (1) Labor To be supported by time sheets signed by both our and Bancroft Construction Company's site representatives, and billed in accordance with the attached schedule(s) of all-inclusive rates covering:
    - (a) Straight-time or premium-time wages, fringe benefits, subsistence and/or travel allowances, in accordance with applicable labor agreements or Contractor's

established policies, for direct and indirect field labor up to and including the level of hourly-paid General Foreman.

- (b) Taxes including, without limitation, Federal and State Unemployment taxes, and FICA taxes.
- (c) Insurance including, without limitation, Workers' Compensation, Employer's Liability, and General Liability Insurance.
- (d) Overhead to cover all other costs not otherwise reimbursed including, but not limited to,
  - small tools (small tools shall be those costing less than \$2500 new)
  - consumable supplies (including welding rod, gases, fuel, etc.) unless otherwise agreed in writing by Bancroft Construction Company
  - field office expenses, including, without limitation, telephone service, utilities and travel expenses
  - home office management and overhead
  - field administration and supervision above the level of General Foreman or equivalent field supervisor.
- (e) Profit.
- (2) Construction Equipment and Large Tools (large tools shall be those costing \$2500 or more new).
  - (a) Owned by Contractor At rates shown on the attached list of rental rates. Notwithstanding any provisions on said list, the rates include all fuel, lubricants, maintenance, and standby costs. Charges shall be based only on actual hours of operation.
  - (b) Rented from a Third Party At actual cost including applicable tax plus 10 % of such actual costs and supported by invoices. Rental of construction equipment and large tools shall be approved in advance by Bancroft Construction Company.
- (3) Materials at actual costs, including applicable tax plus 10% of such actual cost for materials purchased by Contractor and supported by invoices. Consumable supplies are not reimbursable under this item.

All extra work must be authorized prior to commencement of work. Authorization will be in the form of a written communication signed by either, Bancroft Construction Company or Delaware Technical & Community College. Written communication can be either, an email, a field directive or a formal letter.

### **D. ORIENTATION**

The contractor, including its site supervisor and all tier subcontractors and their site supervisors, shall attend a meeting with Bancroft representatives at the job site within (3) working days after

verbal award or letter of intent to discuss work schedules, safety expectations, project documentation and other relevant matters.

### E. SCHEDULES

Within (10) calendar days after oral notification of award and before any progress payments are processed, Contractor shall furnish two (2) copies of the following schedules to Bancroft:

- a. Schedule of Values: Contractor to submit a detailed schedule of values that payment and progress will be based upon. The Schedule of Values is to pro-rate intangible expenses such as profit, overhead expenses and fees over the entire billing. The Schedule of Values is to include enough detail for each aspect of the work. Bancroft will review and return the Schedule of Values with direction within 10 working days. Contractor to revise and resubmit schedule of values as requested. Progress Payments will not be approved until the Schedule of Values is approved.
- b. Submittal Schedule:

Contractor to submit a detailed Submittal Schedule in CSI order for submission and review listing the submittal item and the target date of submittal for all shop drawings, catalog cuts, brochures, samples, certificates of compliance, etc. (submittals) required by the specifications or other contract documents.

The schedule shall provide ample time to permit review, fabrication, and delivery so as not to delay the work of Contractor, its subcontractors, or other contractors. In establishing the schedule, Contractor shall allow (10) working days after receipt for Bancroft's initial review of the Submittal Schedule and for each subsequent review. The schedule shall indicate the anticipated dates of original submission for each item and Bancroft's approval of each submittal.

All submittals shall be furnished within (25) working days after oral notification of award. If a submittal cannot be furnished within the stated period, an explanation indicating the reason(s) the submittal cannot be made within the required time is to be submitted along with the Submittal Schedule for review and approval by Bancroft.

c. Construction Schedule - A detailed construction schedule consisting of:

A detailed bar chart in Microsoft Project format or equal showing all construction activities needed for the orderly performance and completion of all work in accordance with the contract. The bar chart shall show all elements of the work, including submittals, fabrication, shipping, and coordination milestones with other trades. The schedule is to reflect the milestones in the contract schedule, the designated phasing plan, and allow the concurrent activity of other trades as shown in the contract schedule.

Contractor shall participate in a review and evaluation by Bancroft of the Construction Schedule. Contractor shall make any changes necessary as a result of this review and resubmit the schedule within five (5) calendar days after the review. Upon resubmission and final approval by Bancroft, all prime contractors shall attend a final approval and acceptance meeting attesting to the schedule contents, durations, start and finish dates, etc. The Construction Schedule shall then be the schedule used by Contractor for performing the work and for reporting progress.

Contractor shall determine the sequence and time estimates of the detailed construction activities, and assume the risk of the practicality and feasibility of the Construction Schedule. Bancroft's acceptance of Contractor's Construction Schedule does not warrant its feasibility or practicality, or Contractor's right to finish earlier than the contract completion date, or the duration, interrelationship, and criticality of construction activities.

Contractor shall promptly inform Bancroft, in writing, of any proposed schedule changes and shall furnish Bancroft a revised schedule within ten (10) calendar days after receipt of Bancroft's written acceptance of the changes. The Construction Schedule shall be updated at least once a month.

### F. SUBMITTALS / SHOP DRAWINGS

Contractor shall furnish all submittals with dated and signed transmittal in accordance with contractor's Submittal Schedule required by Article E.b). Transmit all submittals to the designated Bancroft representative and Field or Office location between the hours of 7:00 am to 3:30 pm Monday thru Friday unless other specific arrangements have been made.

Contractor shall check and approve all submittals for adherence to the contract documents and for materials and equipment to be furnished by its subcontractors, manufacturers, and suppliers before transmitting to Bancroft.

Contractor's approval shall constitute a representation to Bancroft that Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data or assumed full responsibility for doing so, and has coordinated each submittal with the requirements of the work and the contract documents. Bancroft will return any submittal lacking indication of Contractor's approval without review.

<u>A transmittal letter shall accompany each submittal</u> for each specification section or item and include the following information:

- a) Date submitted or resubmitted.
- b) Contractor's name.
- c) The names of the supplier and the manufacturer.
- d) Identification of the item the submittal covers
- e) Identification of the applicable specification and section number.
- f) Identification of any deviations from the contract documents.
- g) Date the submittal must be returned for Contractor to meet the construction schedule. Bancroft requires (10) working days following receipt of the submittal for review.
- h) Contractor's signed certification that the submittal has been reviewed and complies with the contract documents. Submittals received without this certification will be returned without being reviewed.

Do not submit on products from more than one specification section in the same submittal unless otherwise noted for coordination purposes. Bancroft's review and approval of submittals will only be for conformance with the design concept and with the information given in the contract documents, and shall not extend to means, methods, techniques, sequences or procedures of construction, or to safety procedures or programs incident thereto. Review and approval of a separate item as such will not indicate approval of the complete assembly of which the item is a component or in which the item functions.

Bancroft's / Architect's review and approval of submittals shall not relieve Contractor of its obligation to comply with the requirements of the contract documents. Release for fabrication, manufacture, or installation of any item before Bancroft's / Architect's review shall be at Contractor's sole risk and responsibility.

Submittals shall be resubmitted until approved. However, any re-submittals or any other delay in obtaining submittal approval will not be grounds for an extension of the contract schedule or an increase in Contractor's compensation, provided the design professional(s) completes their review within the specified time.

Approval of submittals shall not relieve Contractor from responsibility for any deviation from the requirements of the contract documents, unless Contractor, in writing, directed Bancroft's attention to such deviation the time the submittal was transmitted and Bancroft provided written approval of the specific deviation. Bancroft's approval shall not relieve Contractor from responsibility for errors or omissions on submittals.

Contractor shall furnish seven (7) copies of each drawing, sheet, page, etc. included with the submittal for Bancroft's internal use, plus one (1) additional copy which will be returned to Contractor reflecting the review action stamp.

Review status designations listed on Bancroft's review action stamp are defined as follows:

- Approved Indicates equipment or material represented by the submittal conforms with the design concept and complies with the intent of the contract documents and is approved for incorporation in the work. Contractor may proceed with fabrication or procurement.
- Approved As Noted Indicates equipment or material represented by the submittal conforms with the design concept, complies with the intent of the contract documents, and is approved for incorporation in the work in accordance with Bancroft's notations. Contractor may proceed with fabrication or procurement and shall furnish a revised submittal responsive to Bancroft's notations on the returned submittal or in the transmittal letter.
- Not Approved / Revise and Resubmit Indicates equipment or material represented by the submittal does not conform with the design concept or comply with the intent of the contract documents and is not approved for incorporation in the work. Contractor shall furnish submittals responsive to the contract documents.

Bancroft, at their discretion, will delegate the responsibility of submittal reviews to the Architect or a Design Professional of their choice. The actions on returned submittals that have been transmitted to the contractor, and noted by the Architect or another professional authorized by Bancroft carry the same authority of the terms herein.

### G. CONSTRUCTION PROGRESS

If, in the opinion of Bancroft, the Contractor falls behind the accepted Construction Schedule, the Contractor shall take the necessary steps to return to schedule, including, but not limited to:

- a) increase in workforce
- b) overtime operations
- c) number of shifts,

### d) number of work days

Contractor's failure to comply with the requirements of this clause shall be grounds for a determination by Bancroft that Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, Bancroft may direct Contractor to take one or more of the above steps to return to schedule at no additional cost, or terminate the Contractor's right to proceed with the work in accordance to the General Conditions. Contractor, upon request, is to provide a written plan within (3) days of request on how the Contractor will rectify the schedule delays, and return to contract schedule. Expenses associated with Bancroft Supervision to cover increased shifts and hours will be billed to sub-contractor associated with schedule delay.

Contractor and its subcontractors shall attend a Weekly Coordination Meeting with Bancroft to review weekly schedules and coordinate interfaces with the activities of other contractors or Bancroft. The contractor representative attending this regularly held meeting is to have the authority to represent the contractor in terms of progress, overall production, change order work, and execution of the contract work. Deviations to scheduled activities, sequences, and durations for each contractor will be discussed at the Weekly Coordination Meeting for the purposes of coordination and project completion. Agreement for schedule deviations to account for field conditions will be obtained at each meeting. Any objections to the sequencing or duration that will have a contractual impact are to be forwarded to Bancroft within (7) calendar days of the Weekly Coordination Meeting in writing.

### H. REPORTS

Contractor shall monitor and control construction progress through the use of the following:

- a. Daily Report A daily report, maintained by Contractor's site supervisor, of significant field events, including the following:
  - a) Weather conditions
  - b) Amount, type and location of work accomplished
  - c) Number of workmen by craft
  - d) Major deliveries
  - e) Persons visiting the site
  - f) Significant problems affecting progress or quality

One copy of the Daily Report shall be furnished to Bancroft at the beginning of the following work day

b. Construction Activity Report - A weekly report containing information on general site conditions, progress of the work, and problem areas. This report shall identify, and be the initial documentation for, any problem that might result in a claim by Contractor at a future date. Contractor shall provide daily Reports on the previous day's progress toward resolution of the circumstances or problems to Bancroft's Construction Manager.

One copy of the Construction Activity Report shall be furnished to Bancroft on the first work day of the following week.

c. Status Report - A monthly report, to be submitted on the 20<sup>th</sup> of each month, prior to the monthly invoice, with the updated Procurement and Construction Schedules, including:

- a) Activities started
- b) Activities completed
- c) Actual material placed
- d) Physical construction progress
- e) Work still to be performed
- f) Problem areas and their potential impact
- g) Action taken to eliminate the problem areas

All outstanding issues shall be resolved on a monthly basis before Contractor's progress payment request is processed.

Contractors are to schedule and sequence their work based on the approved contract schedule. When contract work is impacted by other trades, contractors are to make every effort to perform work in other areas without interruption or additional expense whenever possible. Bancroft will facilitate continuous work for each discipline to the extent that it is practical and feasible for each type of work.

### I. INDEPENDENT TESTING

Materials testing, if required, will be performed by an independent testing agency, under this contract unless otherwise noted in the Summary of Work. Contractor to contact the testing agency representative to arrange for on-site testing and notify Bancroft. Copies of test reports will be provided to Bancroft by the testing firm. Please note when the testing agency is under the jurisdiction of Bancroft or the Owner the contractor may bear the following costs:

- a) Stand-by or call out of testing technician when Contractor is not ready for tests (beyond the agreed upon testing schedule between Contractor and Bancroft).
- b) Delays to Contractor, its tier subcontractors or third parties due to Contractor's failure to notify Bancroft with sufficient notice to arrange for testing at the proper time.
- c) Re-testing materials which had previously failed.
- d) Delays to Contractor, its tier subcontractors or third parties while waiting for materials to be reworked and re-tested.

### J. TRADE PERMITS

Contractor is required to obtain and pay for any required "trade" permits, such as plumbing, electrical etc., from proper governing authorities unless noted otherwise in the Summary of Work.

### K. RECORD DOCUMENTS

Record Documents: After Substantial Completion, and prior to application for final payment, contractor is to submit for review and approval a set of contract drawings that have been noted with all field, contract, and site deviations and information. This 'as-built' set is to be updated on an as needed basis and be available for inspection upon request during the course of the project.

### L. INSPECTIONS & SUBSTANTIAL COMPLETION

Contractor will notify Bancroft Construction Company in a timely manner, the need for all inspections that may or will be required by the local governing agencies.

After contractor has completed his work to the best of his knowledge, including any defects or omissions that have been brought to his attention during the progress of the work, he is to submit a written request for final inspection to Bancroft for each phase. Within five (5) working days from

receipt of request, Bancroft will inspect and issue a punch list, and allow the contractor ten (10) working days to address any and all of the punch list items. Contractor is to return the list to Bancroft with verification that the work is complete accompanied with second written request for a Substantial Completion Inspection. Bancroft and Contractor will then confirm completion within three (3) days of the final request to verify that the work is complete. The successful completion of the above process will signify substantial completion and serve as the date for evaluating completion as it relates to liquidated damages. Premature requests for inspections that indicate work is not complete as stated by the contractor will nullify the request and may result in back charges to the contractor for Bancroft time. At the Owner's discretion, minor deficiencies that will not impact client acceptance may be deferred and a conditional notice of Substantial Completion may be issued. Delinquent work that has to be completed after owner occupancy is to be performed during off-hours and at client's convenience with no additional expense to Bancroft. The above process does not alleviate contractor for fulfilling his contractual obligations or completing deficient work within project milestones and contract end date(s)

### M. EQUIPMENT OPERATION DURING CONSTRUCTION

Operations, care and maintenance of all equipment purchased and installed by each respective contractor is to remain within their responsibility until owner acceptance. Temporary operation of mechanical and electrical systems required to support the project progress and/or that which is required to maintain an operational environment throughout the project duration is to be included and accounted for within the contract price.

### N. DAMAGES

Contractor will be held responsible for employees causing damage to other contractor's work and equipment during the progress of their work. Each contractor and their employees are to respect the work in place and take due care in the performance of their work as it relates to other trades. Evidence of willful and/or wanton disregard to other contractors work will not be tolerated and expenses associated with repairs disbursed among responsible parties.

### **O. SUPERVISION**

Each prime contractor will provide appropriate off-site and on-site supervision throughout the duration of the project for all trades and associated work under their contract as described in their respective Summary of Work. Bancroft, at their discretion may request a change in the field or office supervision to improve on the progress of the project.

### P. PRECEDENCE OF DOCUMENTS

The precedence of contract documents is as follows listed in descending order:

- a. Purchase Order
- b. General Conditions
- c. Addenda
- d. Instructions to Bidders
- e. Summary of Work
- f. Special Conditions
- g. Site Conditions
- h. Specifications Project Manual
- i. Drawings
  - i. Schedules
  - ii. Riser and Single Line Diagrams
  - iii. Large scale details

- iv. Floor Plans
- j. Other papers

### Q. FIRST DELIVERY OF MATERIAL/EQUIPMENT INSPECTION

Trade Contractors will notify Bancroft with each type of specified material and equipment delivery dates. Bancroft inspects and documents the first site delivery of each type of material and equipment. Delivery will be verified against the requirements of the design documents and the approved shop drawings. Non-conforming materials and/or equipment will not be allowed to be set into place and may be required to be removed from the site. Remedial measures will only be considered if they are in the best interests of the Project and approved by the Project Team.

### R. MOCK UP

Bancroft will include all mock-ups in the construction schedule, tied to precede work requiring mock-up approval. Prior to start of mock-up construction, Trade Contractors will review the plans, specifications, submittals, shop drawings, codes, and referenced standards to assure full understanding of the requirements. Bancroft will inspect each work type within the Mock-up at completion for conformance to the requirements and the Design Professionals, and or the Owner approves the work. Specific concerns and or problems are documented by Bancroft to prevent repetition in later construction.

### S. IN WALL AND ABOVE CEILING ACCEPTANCE

Bancroft obtains signatures of all Trade Contractors indicating that their concealed work is complete <u>prior</u> to calling for inspection. Prior to placing concrete, wall closure or finished ceiling installation, the Inspection Team inspects the work for conformance with the requirements. Owner's maintenance personnel should be involved where possible. Photographs of concealed spaces are recommended for the Owner's future reference, subject to project requirements. No concrete wall or ceiling closure work shall proceed until <u>all</u> requirements are met.

END OF SECTION 006000

Addendum 1

### **SECTION 006216 - INSURANCE**

In conjunction with Insurance Requirements AIA General Conditions, Article 11, the Contractor shall be bound by the following limits of liability insurance (for Contracts under this Bid Pac). The Contractor shall use the standard "ACCORD" for titled "Certificate of Insurance" in submitting his liability insurance limits. The required limits to be inserted in accordance with the sample "ACCORD" form in this section:

### **GENERAL NOTES**

- 1. Other Insurance
  - Contractor shall carry any necessary insurance required to cover Owned and Rental 1.1 equipment that may be necessary for them to use in the performance of the Work.
- 2. Contractor shall have the following additional items added to his required "ACCORD" form Certificate of Insurance:
  - 1. Name and Address of Insured (Contractor).
  - Description of Operations/Locations -2.
- Added Insured Delaware Technical & Community Collage 3.
- 4. Certificate Holder - Delaware Technical & Community Collage

Contractors shall note that although not a part of AIA Document A201 - 2007 Edition, these additional articles apply as noted to this Project.

A sample certificate is bound into the Project Manual immediately following this Document.

END OF SECTION

|   |                           |  |              | _  |                  | OP ID: RM           |  |
|---|---------------------------|--|--------------|--|------------------|---------------------|--|
| ACORD <sup>®</sup> CERTIFIC   | ATE OF LIAB               | LITY IN  | SURA         | NCE                                      | DATE (<br>2/15/2 | мм/dd/үүүү)<br>2013 |  |
| THIS CERTIFICATE IS ISSUED AS A MATTER (  | OF INFORMATION ONLY AN    | ID CONFERS N   | IO RIGHTS    |  |                  |                     |  |
| CERTIFICATE DOES NOT AFFIRMATIVELY OR   | R NEGATIVELY AMEND, EX    | TEND OR ALT  | ER THE CO    | VERAGE AFFORDED E                        | ЗҮ ТНЕ           | POLICIES            |  |
| BELOW. THIS CERTIFICATE OF INSURANCE  |                           | A CONTRACT   | BETWEEN T    | HE ISSUING INSURER                       | (S), AU          | THORIZED            |  |
| REPRESENTATIVE OR PRODUCER, AND THE CI  |                           |  |              |  |                  |                     |  |
| IMPORTANT: If the certificate holder is an ADD  |                           |  |              |  |                  |                     |  |
| the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s). |                           |  |              |  |                  |                     |  |
| PRODUCER  | 00                        | TACT   |              |  |                  |                     |  |
| Insurance Company   |                           | NAME:           PHONE         FAX           (A/C, No, Ext):         (A/C, No):                     |              |  |                  |                     |  |
| Name and Address  |                           | E-MAIL   |              |  |                  |                     |  |
|   |                           | ADDRESS:<br>INSURER(S) AFFORDING COVERAGE NAIC #   |              |  |                  |                     |  |
|   |                           |  |              |  |                  |                     |  |
| INSURED Subcontractor Name and  |                           |  |              |  |                  |                     |  |
|   |                           |  |              |  |                  |                     |  |
| Address here  |                           |  |              |  |                  |                     |  |
|   |                           |  |              |  |                  |                     |  |
|   |                           |  |              |  |                  |                     |  |
| COVERAGES CERTIFICATE   |                           |  |              |  |                  |                     |  |
| COVERAGES CERTIFICATE NUMBER:<br>THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO TH  |                           |  |              |  |                  |                     |  |
| INDICATED. NOTWITHSTANDING ANY REQUIREMEN   | NT, TERM OR CONDITION OF  | ANY CONTRACT   | OR OTHER I   | DOCUMENT WITH RESPE                      | ст то \          | NHICH THIS          |  |
| CERTIFICATE MAY BE ISSUED OR MAY PERTAIN,<br>EXCLUSIONS AND CONDITIONS OF SUCH POLICIES.  |                           |  |              | ) HEREIN IS SUBJECT TO                   | O ALL T          | HE TERMS,           |  |
| INSR ADDL SUBR  |                           | POLICY EFF   | POLICY EXP   | LIMIT                                    |                  |                     |  |
| LTR TYPE OF INSURANCE INSR WVD  | POLICY NUMBER             | (MM/DD/YYYY)   | (MM/DD/YYYY) | EACH OCCURRENCE                          | \$               | 1,000,000           |  |
| A X COMMERCIAL GENERAL LIABILITY X  | I.                        |  |              | DAMAGE TO RENTED                         | ъ<br>\$          | 100,000             |  |
|   |                           |  |              | PREMISES (Ea occurrence)                 | \$               | 5,000               |  |
|   |                           |  |              | MED EXP (Any one person)                 |                  | 1,000,000           |  |
|   |                           |  |              | PERSONAL & ADV INJURY                    | \$<br>\$         | 2,000,000           |  |
|   |                           |  |              | GENERAL AGGREGATE                        | \$               | 2,000,000           |  |
|   |                           |  |              | PRODUCTS - COMP/OP AGG                   | \$<br>\$         | 2,000,000           |  |
|   |                           |  |              | COMBINED SINGLE LIMIT                    |                  | 1.000.000           |  |
| A X ANY AUTO  |                           |  |              | Ea accident)<br>DILY INJURY (Per person) | \$<br>\$         | 1,000,000           |  |
|   |                           |  | - 11 V       | BULY INJURY (Per accident)               |                  |                     |  |
| AUTOS AUTOS NON-OWNED AUTOS AUTOS   |                           |  | NL           | PERTY DAMAGE                             | \$               |                     |  |
| HIRED AUTOS   |                           |  |              | er accident)                             | \$               |                     |  |
| UMBRELLA LIAB OCCUR   |                           |  |              | EACH OCCURRENCE                          | \$               | 10.000.000          |  |
| A X EXCESS LIAB CLAIMS-MADE   |                           |  |              | AGGREGATE                                | \$               |                     |  |
| DED RETENTION \$  | - DMLL.                   |  |              | NOOREONIE                                | \$               |                     |  |
| WORKERS COMPENSATION  | CODI                      |  |              | WC STATU- OTH-<br>TORY LIMITS ER         | , v              | -                   |  |
|   | IFU                       |  |              | E.L. EACH ACCIDENT                       | \$               | 500,000             |  |
| OFFICER/MEMBER EXCLUDED?  | FORMAT                    |  |              | E.L. DISEASE - EA EMPLOYEE               |                  | 500,000             |  |
| If yes, describe under<br>DESCRIPTION OF OPERATIONS below   |                           |  |              | E.L. DISEASE - POLICY LIMIT              |                  | 500,000             |  |
|   |                           |  |              |  |                  | ,                   |  |
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|   |                           |  |              |  |                  |                     |  |
| DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach A  |                           | lule, if more space is   | required)    |  |                  |                     |  |
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|   | AUTHORIZED REPRESENTATIVE |  |              |  |                  |                     |  |
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|   | 1                         |  |              |  |                  |                     |  |

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### General Conditions of the Contract for Construction

for the following PROJECT: (Name and location or address

THE OWNER: (Name, legal status and address)

THE ARCHITECT: (Name, legal status and address)

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### **ARTICLE 1 GENERAL PROVISIONS** § 1.1 BASIC DEFINITIONS

### § 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

### § 1.1.2 THE CONTRACT

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

### § 1.1.3 THE WORK

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

### § 1.1.4 THE PROJECT

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

### § 1.1.5 THE DRAWINGS

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

### § 1.1.6 THE SPECIFICATIONS

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

### § 1.1.7 INSTRUMENTS OF SERVICE

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

### § 1.1.8 INITIAL DECISION MAKER

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

### § 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

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

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

### § 1.3 CAPITALIZATION

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

### § 1.4 INTERPRETATION

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

### § 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

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

### § 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

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

### ARTICLE 2 OWNER

### § 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

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

### § 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

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

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

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

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

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

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

### § 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

### § 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

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

### ARTICLE 3 CONTRACTOR

### § 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

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

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

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### § 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

### § 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

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

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

### § 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

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facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

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

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

### § 3.5 WARRANTY

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

### § 3.6 TAXES

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

### § 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

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

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

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

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

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the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

### § 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and .1 all required taxes, less applicable trade discounts;
- Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and .2 other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly .3 by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

### § 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

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

### § 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

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

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

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

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### § 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

### **§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

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

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

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

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

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

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

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

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

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

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

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required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

### § 3.13 USE OF SITE

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

### § 3.14 CUTTING AND PATCHING

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

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

### § 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

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

### § 3.16 ACCESS TO WORK

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

### § 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

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#### § 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

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

#### **ARTICLE 4 ARCHITECT**

#### § 4.1 GENERAL

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

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

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

#### § 4.2 ADMINISTRATION OF THE CONTRACT

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

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#### § 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

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

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

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

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

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

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

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§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

#### **ARTICLE 5 SUBCONTRACTORS**

#### § 5.1 DEFINITIONS

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

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Subsubcontractor.

## § 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

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

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

## § 5.3 SUBCONTRACTUAL RELATIONS

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

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be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

#### § 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- assignment is effective only after termination of the Contract by the Owner for cause pursuant to .1 Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the .2 Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

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

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

#### ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS § 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

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

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

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

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

#### § 6.2 MUTUAL RESPONSIBILITY

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

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the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

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

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

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

#### § 6.3 OWNER'S RIGHT TO CLEAN UP

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

## ARTICLE 7 CHANGES IN THE WORK

#### § 7.1 GENERAL

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

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

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

## § 7.2 CHANGE ORDERS

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

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

#### § 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to .1 permit evaluation;
- Unit prices stated in the Contract Documents or subsequently agreed upon; .2
- Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or .3 percentage fee; or

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.4 As provided in Section 7.3.7.

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

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

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

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

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

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

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

#### § 7.4 MINOR CHANGES IN THE WORK

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

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#### ARTICLE 8 TIME § 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

#### § 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

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

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

#### § 8.3 DELAYS AND EXTENSIONS OF TIME

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

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

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

#### ARTICLE 9 PAYMENTS AND COMPLETION § 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

#### § 9.2 SCHEDULE OF VALUES

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

#### § 9.3 APPLICATIONS FOR PAYMENT

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

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

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

#### § 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous onsite inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

#### § 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- defective Work not remedied; .1
- third party claims filed or reasonable evidence indicating probable filing of such claims unless .2 security acceptable to the Owner is provided by the Contractor;

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- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

#### § 9.6 PROGRESS PAYMENTS

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

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

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

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

#### § 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

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stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

#### § 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

#### § 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

#### **§ 9.10 FINAL COMPLETION AND FINAL PAYMENT**

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

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Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

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

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

#### ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY § 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

#### § 10.2 SAFETY OF PERSONS AND PROPERTY

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

- employees on the Work and other persons who may be affected thereby; .1
- the Work and materials and equipment to be incorporated therein, whether in storage on or off the .2 site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Subsubcontractors; and
- other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, .3 roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

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§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

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

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

#### § 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

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

#### § 10.3 HAZARDOUS MATERIALS

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

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

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§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

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

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

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

#### § 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

#### ARTICLE 11 INSURANCE AND BONDS

#### § 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

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

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

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of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

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

#### § 11.2 OWNER'S LIABILITY INSURANCE

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

#### § 11.3 PROPERTY INSURANCE

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

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

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

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

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

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

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

#### § 11.3.2 BOILER AND MACHINERY INSURANCE

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

#### § 11.3.3 LOSS OF USE INSURANCE

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

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

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

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

#### § 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, subsubcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, subsubcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

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

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

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Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

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

#### § 11.4 PERFORMANCE BOND AND PAYMENT BOND

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

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

#### ARTICLE 12 UNCOVERING AND CORRECTION OF WORK § 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

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

#### § 12.2 CORRECTION OF WORK

#### § 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

#### § 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

#### § 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

#### ARTICLE 13 MISCELLANEOUS PROVISIONS

#### § 13.1 GOVERNING LAW

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

#### § 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

#### § 13.3 WRITTEN NOTICE

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

#### § 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

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#### § 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

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

#### § 13.6 INTEREST

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

#### § 13.7 TIME LIMITS ON CLAIMS

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

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

#### § 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- Issuance of an order of a court or other public authority having jurisdiction that requires all Work to .1 be stopped;
- An act of government, such as a declaration of national emergency that requires all Work to be .2 stopped;

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- Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of .3 the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable .4 evidence as required by Section 2.2.1.

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

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

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

#### § 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- repeatedly refuses or fails to supply enough properly skilled workers or proper materials; .1
- fails to make payment to Subcontractors for materials or labor in accordance with the respective .2 agreements between the Contractor and the Subcontractors;
- repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful .3 orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- Exclude the Contractor from the site and take possession of all materials, equipment, tools, and .1 construction equipment and machinery thereon owned by the Contractor;
- Accept assignment of subcontracts pursuant to Section 5.4; and .2
- Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written .3 request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

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

#### § 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

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§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- that performance is, was or would have been so suspended, delayed or interrupted by another cause .1 for which the Contractor is responsible; or
- that an equitable adjustment is made or denied under another provision of the Contract. .2

#### § 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

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

- cease operations as directed by the Owner in the notice; .1
- take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; .2
- except for Work directed to be performed prior to the effective date of termination stated in the .3 notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

## ARTICLE 15 CLAIMS AND DISPUTES

## § 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

## § 15.1.2 NOTICE OF CLAIMS

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

#### § 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

#### § 15.1.4 CLAIMS FOR ADDITIONAL COST

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

#### § 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

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#### § 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

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

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

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

#### § 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

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

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

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

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§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

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

#### § 15.3 MEDIATION

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

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

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

#### § 15.4 ARBITRATION

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

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

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

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

#### § 15.4.4 CONSOLIDATION OR JOINDER

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

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

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additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

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

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# **Certification of Document's Authenticity**

AIA<sup>®</sup> Document D401<sup>™</sup> - 2003

I, Jane Best-Weick, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:48:57 on 03/01/2010 under Order No.  $4263420622_1$  from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA<sup>®</sup> Document A201<sup>TM</sup> – 2007 - General Conditions of the Contract for Construction, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

1



Planning Architecture Interior desian

Graphic Design

Project Management

## **RELEASE FORM FOR ELECTRONIC FILES**

| OWNER:            |       |
|-------------------|-------|
| PROJECT:          |       |
| LIST OF DRAWINGS: |       |
| USAGE FEE:        | DATE: |
|                   |       |

#### **Definitions**:

All electronic information and other instruments of service provided by BSA+A and its consultants, 715 North Orange Street, Wilmington, DE 19801, which include everything transmitted on electronic storage media, from a website, or via the Internet, is known as the Data. The Recipient is the undersigned firm or individual requesting the Data.

## Terms:

In accepting and utilizing the Data, the Recipient agrees with the following Terms:

- 1. The General Contractor/Construction Manager, and every subcontractor using the Data shall each return one signed copy of this Release Form to BSA+A.
- 2. DISTRIBUTION AND COORDINATION: The Recipient will <u>not</u> distribute the Data to any other firm or individual, except for the Recipient's consultants or subcontractors. If BSA+A issues an update or change in the Data during the course of the project, the General Contractor/Construction Manager is responsible for distribution and coordination. Transfer of electronic data does <u>not</u> include subsequent updates and revisions
- 2. USE: The Data will be used only for the specific project and owner listed above. None of the Data will be used for any other project or purpose, at this or any other site. Indicia/Title Block may be removed at the discretion of the design professional. The
- 3. OWNERSHIP: Copyright and ownership of the Data are not transferred to the Recipient, or to any other party. BSA+A and/or Owner retain all rights to the Data.
- 4. ACCURACY: Design data is never perfect. The information is not guaranteed to be accurate. The method of data transfer cannot be guaranteed to be error-free, durable, or compatible with the Recipient's hardware, software or output systems. Any defects discovered by the Recipient shall be reported to BSA+A. Contractors and subcontractors are not relieved of their normal responsibilities to independently check, coordinate & verify information and dimensions, and to familiarize themselves thoroughly with the project.
- Electronic data (CADD drawings) shall be provided for use as background plans only. Contractor shall be responsible for verification of all dimensions and revisions. Contractor shall not have, copy or reproduce details, elevations, sections, schedules or other similar data.
- 6. Neither BSA+A nor its consultants are not to be held liable for any damages attributable to the use of the Data, or changes and additions made to the Data by you or your consultants or subcontractors. The Undersigned agrees, to the fullest extent permitted by law, to indemnify and hold BSA+A and its consultants harmless from any damage, liability or cost, including reasonable attorney's fees and costs of defense, arising from any changes made by anyone other than the Firm or from any reuse of the drawings and data without the prior written consent of BSA+A and its consultants.
- 7. This agreement shall be governed by the laws of Delaware.
- 8. The Undersigned agrees to make payment of \$150 processing fee for <u>each</u> consultant's electronic files to BSA+A prior to release of any electronic media release.

#### chitect ss, Inc. GENERAL CONTRACTOR, CONSTRUCTION MANAGER, OR SUBCONTRACTOR: Print Clearly:

| Signed    | Date:      | DEEE 1 |
|-----------|------------|--------|
| Phone:    | Email:     |        |
| Address:  |            |        |
|           |            |        |
| Name:     |            |        |
| Recipient | t Company: |        |

Buck Simpers Architect + Associates, Inc.

715 North Orange Street Wilmington, DE 19801

> 302.658.9300 fax 658.1125

www.simpers.com

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## SECTION 010000 - GENERAL REQUIREMENTS

## PART 1 - GENERAL

- A. The purpose of this section is to supplement the construction documentation prepared by the Project Architect. Since site conditions do vary from site to site, the Construction Manager (hereinafter referred to as "Contractor") agrees that he has visited the proposed site for this project and that his price includes all work necessary to complete the scope as intended on the drawings and as required to obtain all required certificates of occupancy.
- B. Specific direction, details documented on the Construction Plans prepared by the Project Architect shall take precedence over this specification should any ambiguity exits between the two.
- C. Contractor shall notify Owner or Owner's authorized representative prior to making any changes, alterations or revisions from the contract plans or specifications. It is the Contractor's responsibility to received written approval from Owner prior to making any changes. Changes made without written approval may be reversed by Owner at Contractor's cost.
- D. The Contractor shall be responsible for all permits and payment of fees, including individual building, individual trade permits (mechanical, electrical sprinkler etc.) taxes, etc., and for obtaining all required certificates for occupancy. The Owner shall assist the contractor in securing inspections, however it is ultimately the Contractor's responsibility to secure both Intermediate Life Safety reviews and inspection and final occupancy approval from Authorities Having Jurisdiction (AHJ) in accordance with the project schedule. All contractors and subcontractors shall have business licenses as required by the governing local jurisdiction.
- E. All work shall be substantially completed on or before the date for in the Contract Documents ("Construction Completion Date"), unless extended in writing by change order or mutual agreement between the Owner and Contractor. Notwithstanding the condition of the Work, the Work shall not be deemed to be substantially complete until such time that Contractor presents Owner with a Certificate(s) of Occupancy or other evidence acceptable to the owner of the approval of the Work by the governing bodies having jurisdiction.
- F. Contractor to submit to Owner/Owner's representative cuts, samples product literature and or shop drawings for all building materials, millwork, fixtures, hardware, mechanical and electrical equipment, design drawings and finishes prior to installation. Approval of submittals is to confirm general compliance

with the project specifications and plans and does not relieve the contractor from complying with the contract documents or applicable codes.

- G. Additional work approved by Owner due to a change in the scope of work as described in the construction documents, shall contain a fee for contractor's profit and overhead in accordance with the supplementary conditions.
- H. Contractor to submit to Owner a list of all proposed subcontractor's prior to the commencement of work. Mechanical and electrical contractors must be approved prior to final contract award. Owner shall have the right of final approval of a subcontractor's and the right to review details of contractor's and sub-contractor's bids, proposals, estimates, etc. Contractor to provide a detailed CPM based schedule which shall include not only contractor's activities but all related project activities required for the successful completion of the project. The schedules shall be coordinated with any schedules or other time restraints identified as part of the bidding package. The schedule shall be updated as project conditions require or at the request of the owner's representative.
- I. Owner shall have the right, at Owner's cost, to hire qualified third party Consultants/Engineers ("Consultants") to review the quality, consistency, and workmanship of any or all of the completed work, and Contractor agrees to cooperate with Consultants. If Consultant determines and documents that the work performed by Contractor or Subcontractor's does not conform to the plans or specifications or the work does not meet applicable governmental codes, building codes or general building standards, Contractor agrees to pay for the cost of said review and repair, replace or otherwise complete remedial work as required.
- J. Prior to the commencement of construction, Contractor shall submit an executed, recordable Waiver of Liens covering the work of the contractor and all subcontractors. All subcontracts written by the contractor shall acknowledge that a Waiver of Liens has been recorded for the project. At project completion and submitted with the final billing. Releases of Liens shall be provided by the contractor and all major subcontractors. Owner shall not be obligated to pay any amount not covered by a release of liens.
- K. In all projects special consideration shall be given to the following air quality/cleanliness items:
  - 1. If new return duct systems are used to condition construction space prior to final occupancy then they shall also be covered with filter media and maintained/replace as needed. Procedures and specifications to comply with LEED Requirements for Indoor Air Quality measures required during

Construction. Equipment warranties or other applicable warranties shall not begin prior to substantial completion.

- L. The Contractors shall visit and examine the premises so as to fully understand all of the existing conditions pertaining to their work.
- M. The Owner reserves the right to designate the order in which the Contractors shall proceed with any and all portions of the work. Work shall be coordinated so as not to interfere with the business of the Owner. No additional work shall be started without the approval of the building's Owner.
- N. The Contractors shall comply with all Federal, State and Municipal Laws and Ordinances and shall give all notices and obtain all permits necessary for the work, and shall pay all cost of fees for same. The Contractors shall familiarize themselves with the rules of all boards, or departments having jurisdiction and with the work shown on the plans. They shall notify the Owner, if in their opinion any work is omitted or if any work or material shown or specified is not in accordance with good practice or these rules.
- O. All noise, dirt and dust shall be kept at an absolute minimum and comply with Owner Policies. All areas shall be left broom clean at the end of each day's operations. Floors shall be protected with "Sisalcraft", or similar paper, wherever alteration work might damage the floor covering.
- P. In the event that any portion of the building is occupied before other areas begin construction, temporary partitions shall be erected by all applicable Contractors before the start of new work and removed by the Contractors at the completion of the work. All Contractors shall submit to the Owner in writing all provisions planned for maintaining ease of access and any "Interim Life Safety Measures" required, and acquire approval from local authorities for interior life safety measures.
- Q. All work shall be completed during normal working hours, unless otherwise specified. If additional work is directed to be completed on premium time, the additional cost of authorized overtime work shall be subject to reimbursement by the Owner, shall be only the actual amounts earned by such craftsmen and supervisors who are directed to work on premium time, and shall include such regular taxes and withholdings as are customary, plus a mark up. A list of craftsmen and supervisor hourly rate will be submitted as a part of the Contract Package.
- R. The Sub-Contractors shall obtain and maintain the insurances in accordance with Owner's requirements:

- 1. General Liability: Comprehensive form, premises operations, products/completed operations, contractual insurance, broad form property damage, independent Contractors, personal injury with limits in amount as specified by Owner for combined single limit for each occurrence.
- 2. Automobile Liability: Comprehensive form, with limits as specified by Owner for single limit for each occurrence (bodily injury and property damage combined).
- 3. Workmen's Compensation Insurance as required by the state(s) in which the contract is to be performed and employer's liability insurance with limits for accident, disease-policy limit, and disease-each employee, as specified by Owner.
- 4. Excess Liability, in the Umbrella Form and on an Occurrence Basis, with limits for combined single unit for each occurrence, as specified by Owner.
- V. Work to be done shall be all inclusive and any work not specifically mentioned but reasonably implied shall be included. This includes any patch and paintwork necessary.
- W. The handling and storage of all welding materials, acetylene and oxygen tanks, burners, etc. if required for the execution of work, shall be subject all times to the approval of the Owner's representative. The Contractor shall provide standby fire extinguishers and all the equipment mentioned herein shall be removed at the end of each working period.
- X. Storage of Flammable Materials:
  - 1. Gasoline, etc. cannot be stored in the building.
  - 2. Oil base paints, varnish, etc., is limited to 20 gallons stored in approved storage cabinets or in a 1 hour rated storeroom with a 4-inch high liquid tight sill at the entry door.
- Y. Handling and storage of welding materials are subject to the following conditions and the approval of the Owner's representative.
  - 1. The Contractor shall obtain a welding permit from all governing agencies applicable.
  - 2. Work area shall be kept free of all combustible material.
  - 3. Fire retardant tarpaulins are acceptable and shall be used.
  - 4. All welding and cutting equipment shall be kept outdoors.
  - 5. If acetylene and oxygen tanks are required indoors, they shall be kept as far from the actual work location as possible.
  - 6. All welding and cutting equipment shall, whenever practical, be removed from the building daily.
  - 7. All equipment such as cables, hoses, regulators, etc., shall be in good condition.

- 8. A fire watch furnished by the Contractors, consisting of at least one man with no other assigned duties, shall be posed at all times to stand by and observe area for any potential hazards while welding or cutting is being done.
- 9. The fire watch shall be equipped with suitable personal eye protection and fire extinguishers as follows:

| Work Area        | Type Extinguishers       | No. Required |
|------------------|--------------------------|--------------|
| Equipment Spaces | CO <sub>2</sub> (15 lb.) | 2            |
| Other Spaces     | Water (2-1/2 gal.)       | 1            |
|                  | CO <sub>2</sub> (15 lb.) | 1            |

- 10. All extinguishers shall be furnished by the Contractors.
- 11. Fire watch shall be provided during and for 30 minutes after operations end for the day. Fire watch must be maintained during short breaks and for 30 minutes at the start of long breaks in the work operations. An inspection of the work area shall be made 1/2 hour after the fire watch ends.
- Z. The Contractor shall keep the building free from rubbish and dirt. No rubbish or materials shall be allowed to accumulate in the building, on the property, or on the street or sidewalk.
- AA. The Contractor shall take all necessary precautions for the safety of the employees on the work site and shall comply with all applicable provisions of federal, state, or municipal safety laws to prevent accidents or injury on or about the property.
- BB. Security Regulations:
  - 1. All persons employed on or visiting the site of the work will be required to observe the Owner's security regulations and must be identified by proper credentials furnished by Owner.
  - 2. Passes for entry to the building will be issued by the Owner to a designated list of supervisory personnel. All working in the building will be required to wear an identification badge furnished by the Owner and prominently displayed.
- CC. The date of final acceptance for each phase of construction shall be that date upon which the Owner occupies the completed area, and the punch list, as built drawings, maintenance manuals, agreements, instructions, diagrams, spare parts lists and parts, warranties, bonds, etc. are signed off as complete and in the Owner possession.

- DD. The Contractors shall maintain a set of contract drawings, specifications and shop drawings of the appropriate package and mark same to show the actual installation where the installation varies from the work as originally shown. Mark sets with red pencil. Use other colors to distinguish between variations in separate categories of the work. Upon completion of the work submit above to the Owner.
- EE. The Constructor shall maintain on the site a stamped permit set of drawings in addition to all construction permits, made available the contract for inspection by building officials and other applicable municipalities required to inspect the site and construction.
- FF. Execution of all work, in particular work involving existing utilities, shall be carefully scheduled with the Owner and shall be undertaken in a manner to minimize disruption of normal operation of the facility and the welfare of the occupants. Scheduling and planning shall be subject to the approval of the Architect and the Owner.
- GG. The Contractors are to refer to AIA Document A201-2007, General Conditions of the Contract for Construction 2007 Edition. This document and the Owner's Policies shall be applicable to this project.
- HH. The Contractors shall be responsible for incorporating into the contract scope all general conditions and special conditions included, or in the contract scope. The Contractor shall be responsible for resolving any contradictory or conflicting items appearing in this section or in the contract documents, by requesting in writing a resolution to be provided by the Architect and Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

3.1

## END OF SECTION 010000

# **SUMMARY OF WORK**

# PLUMBING, MECHANICAL, & ATC

Date: June 30, 2014

## SUMMARY OF WORK INCLUDES:

- 1. Contract Description
- 2. Scope of Work
- 3. Work by Others
- 4. Equipment Supplied by Construction Manager / Owner
- 5. Coordination with Others
- 6. Use of Site & Premises
- 7. Scope Clarifications
- 8. Specification Clarifications
- 9. Drawing specifications
- 10. Contract Drawings & Specifications
- 11. Contract Schedule / Sequencing
- 12. Liquidated Damages
- 13. Subcontractors
- 14. Notes
- 15. Allowances/Alternates/Unit Prices

## 1 CONTRACT DESCRIPTION

- 1.1 Firm fixed price contract with provisions for contract adjustments, allowances, alternates, unit prices and change orders based on the terms and conditions set forth in this contract bid package.
- 1.2 Contract documents are as referenced in the Table of Contents

#### 2 SCOPE OF WORK

- 2.1 This contract will include all work as defined in the contract documents and described herein. The scope of work is based on the contract drawings and specifications referenced in Section 10 of this document.
- 2.2 In summary, the <u>**Plumbing, Mechanical, & ATC**</u> work includes work as defined in the specifications and the drawings and includes but is not limited to the following:

## SUMMARY OF WORK – PLUMBING, MECHANICAL, & ATC

Furnish all labor, equipment, and materials necessary to install all work related to a 100% complete mechanical, plumbing, and ATC system inclusive of all mechanical and plumbing permits and inspections, layout, coordination drawings, testing and balancing and complete systems commissioning; installation of new under-slab facilities; coordination drawings and shop drawings; all mechanical systems and supports; all testing and balancing and commissioning requirements; temporary and weather protection, as-builts and daily clean-up.

## 3 WORK BY OTHERS

- 3.1 The following is excluded from this contract package and will be performed by others as indicated in the Specifications Sections applicable to each trade listed below:
  - 3.1.1 Dumpsters for construction waste and recycling. Contractor shall be required to place all waste and recycling in dumpsters supplied by others.
  - 3.1.2 All miscellaneous steel, roofing, selective demolition (excluding concrete saw cutting for utility services), caulking, doors, frames, and hardware, walls and partitions, acoustical ceilings, laboratory casework, flooring, painting, and wall covering, fire suppression, and all 120V electrical and greater.
  - 3.1.1 Demolition and removal of existing plumbing, mechanical, & ATC.

## 4 EQUIPMENT SUPPLIED BY CONSTRUCTION MANAGER / OWNER

4.1 The following equipment will be purchased by the CM/Owner for installation and or final connection by contractor unless otherwise noted:

4.1.1 N/A

## 5 COORDINATION WITH OTHERS

- 5.1 Contractor to note and account for concurrent construction activity at the project site by multiple disciplines. All contractors shall coordinate their work with the other trades.
- 5.2 Mandatory weekly project meetings will be held by Bancroft to coordinate and plan detailed activities in the field. A designated representative for each prime contractor <u>shall</u> attend each meeting and be authorized to speak on behalf of his company. Job Progress meetings will be held each week at a time and location to be determined. The Construction manager reserves the right to change the meeting days, times and places.
- 5.3 All contractors to schedule and sequence their work based on approved contract schedules. When contract work is affected by other trades, contractors are to make every effort to perform work in other areas without interruption or additional expense whenever possible. CM will facilitate continuous work for each discipline to the extent that it practical and feasible for each type of work.

## 6 USE OF SITE & PREMISES

- 6.1 Contractors to note the use of site & premises as defined in Bancroft's Special and Site Conditions.
- 6.2 Interruption of any services to the building is to be scheduled, in advance, and coordinated with Bancroft Construction Company.

## SUMMARY OF WORK – PLUMBING, MECHANICAL, & ATC

## 7 SCOPE CLARIFICATIONS

## 7.1 CONTRACTOR SCOPE CLARIFICATIONS

- 7.1.1 This contract shall include all labor, equipment and materials, etc., which are necessary to safely perform the work of this contract, as described in the contract documents in their entirety.
- 7.1.2 The following work items are highlights of the work to be performed under this Summary of Work Agreement. These items are listed to clarify the Scope of Work, but are not intended to be an all-inclusive list of the work required. This Subcontractor is responsible for reading and understanding all sections of the specifications and all drawings provided in the contract document.
- 7.1.3 Furnish and install all required mechanical and plumbing connections to owner supplied equipment and appliances.
- 7.1.4 Contractor shall provide safing of existing lines for demolition of the renovation area. Contractor shall have personnel present during demolition performed by others to provide disconnection and reconnection of any piping, duct, etc. to maintain services through the building/campus. This cost is included herein. Contractor shall notify Bancroft Construction Company of any shutdowns, or loss of services.
- 7.1.5 Furnish and install all plumbing fixtures per plans and specifications and codes. Obtain all mechanical permits and schedule all related inspections. Coordinate inspections with CM and other trades.
- 7.1.6 Furnish and install all HVAC / mechanical systems(s) per the contract documents, state and local codes and SMACNA standards.
- 7.1.7 Furnish and install all HVAC / mechanical and plumbing insulation as defined in the project design documents.
- 7.1.8 Furnish and install all miscellaneous supports and anchors required for the proper installation of any and mechanical systems (i.e. pipe, duct rails / supports, etc.). Do not use the building structure for support (refer to design drawing notes) for HVAC equipment, duct and piping.
- 7.1.9 Provide and install a complete ATC system per the plans and specifications. Include all low voltage wiring for all controls for a complete fully functioning systems regardless if system is maintained by ATC. Provide all required commissioning, support coordination and training. Contractor shall thoroughly understand comply and complete all ATC requirements including systems controls sequence of operation, alarms, t-stat programming set point programming. Basis of design ATC system by Johnson Controls and installed by Modern Controls or approved equal manufacturer. Reference section 15 of this Summary of Work.
- 7.1.10 Provide and perform all water treatment (sterilization, cleaning and flushing) and testing documentation in accordance with the plans and specification.
- 7.1.11 Provide and perform all HVAC / mechanical testing (i.e. pressure and duct leak testing). Provide and perform all testing and balancing and documentation in accordance with the plans and specifications and SMACNA standards.

- 7.1.12 Provide all required start-up and warranty per plans and specification and standards. Provide all necessary assistance and coordination during the start-up of all mechanical equipment.
- 7.1.13 In general, the contractor must abide by and perform all aspects of work as defined, detailed and noted on the design drawings which include general HVAC notes; Commissioning notes; Drawing notes; the Mechanical Equipment & Schedule and Wiring Diagrams.
- 7.1.14 Provide and install all labeling and identification for piping, valves, etc.
- 7.1.15 Patch and repair all cores / penetrations in floor, walls or structural components. Note: Contractor shall obtain approval from structural engineer prior to any structural component being cut, drilled or otherwise modified.
- 7.1.16 Provide and install all plumbing fixtures and equipment per plans and specifications. Coordinate with CM and other trades for installation of fixtures (i.e. sink installation with casework and countertop contractor).
- 7.1.17 Provide all manpower, equipment and material to layout, saw-cut concrete, excavate, install, test and backfill, reinforcement bar and concrete for all underslab plumbing scope items. Contractor shall include all coredrilling of slabs on deck for plumbing scope items.
- 7.1.18 Furnish and install ADA compliant dishwasher, including all connections.
- 7.1.19 Furnish and install deonized water generator, including al connections.
- 7.1.20 Contractor shall furnish and install all firesafing, fire sealing, and fire caulking for work performed under this Summary of Work.
- 7.1.21 Contractor shall furnish and install all access panels to the rough carpentry contractor before walls and ceilings are installed. Lockable access panels shall be furnished for areas accessible to the general public. Fire rated access panels shall be furnished for locations in fire-rated partitions. Locations shall be detailed in the Contractor's shop drawings for coordination and layout with the rough carpentry contractor.
- 7.1.22 Include coordination with testing and inspection agencies.
- 7.1.23 Include all necessary curing to comply with the specifications,
- 7.1.24 Include protection of your newly installed materials.
- 7.2 Additional Considerations for the Contractor
  - 7.2.1 Bid Clarification meeting to be held with each apparent low bidder shortly after the bid due date.
  - 7.2.2 If there is a conflict between governing codes, manuals, and conditions and the project specifications and conditions, the contractor will be held responsible to the most stringent requirement.
  - 7.2.3 All hoisting, lifting, hauling equipment necessary to off load, hoist, lift, etc. materials required under this Summary of Work. All scaffolding and/or shoring required to complete this summary of work.

- 7.2.4 All contractors are to respect the neighbors. Contractors are to keep roads clean, obey all traffic signs/laws, keep site clean and organized, park in designated areas.
- 7.2.5 All employees must attend a one time site and safety orientation (approx. 15 minutes) in the Bancroft trailer before their 1st day of work on the project. All employees will be badged after this orientation. This badge will be required to be visible at all times while on site.
- 7.2.6 Contractor will participate in a Formal Review Process for all "Typical First Installations" of systems, components, devices, etc., which will be chosen at the discretion of the CM, the Owner, the Architect and/or the Engineers. This process will ensure a level of quality in the installation of all systems, components, devices, etc.
- 7.2.7 Materials testing, if required, will be performed by an independent testing agency under contract with Owner/Construction Manager. Contractor shall contact the pre-arranged testing agency representative to arrange for on-site testing. Copies of the test reports will be provided to the Contractor and the Owner / CM by the testing firm. Contractor shall bear the following costs: Stand-by or call out of testing technician when Contractor is not ready for tests. Delays to Contractor, its tier subcontractors or third parties due to Contractor's failure to arrange for testing at the proper time. Retesting of materials which had previously failed. Delays to Contractor, its tier subcontractors or third parties or third parties while waiting for materials to be reworked and retested.
- 7.2.8 When/if applicable, contractors will own, offloading, handling and placement of Owner provided items.
- 7.2.9 Each Contractor is to provide protection of existing finishes to remain adjacent to their installations.
- 7.2.10 Contractor owns proper barricading/signage to prevent use or traffic over newly installed materials/equipment/product until acceptable (i.e. dry, cured, etc.)
- 7.2.11 Contractor's own final cleaning of their installations per manufacturer recommendations.
- 7.2.12 Use of lay down areas must be coordinated with the Bancroft project team. Areas are limited and will be issued based on a coordinated plan to be determined in jobsite project meetings.
- 7.2.13 Clean the work areas daily (at a minimum) or more often if trash or debris becomes a safety or fire hazard. Remove all trash and debris to the dumpster(s) daily (no exceptions). Provide trash carts, trash cans, brooms, mops, mop buckets, dust pans and brushes, other cleaning supplies, etc. for this project as necessary. Allow for appropriate and immediate cleanup of spilled trash, fuel, oil, grease, etc. in any project work area on this site.
- 7.2.14 As-builts Through the duration of the project record all deviations, including extra work, from the project documents on a clean set of project drawings. Drawings marked neatly by hand are acceptable. These as-built records will be randomly inspected by Bancroft during the course of the work for accuracy and completeness. Field review of the as-built documentation will be part of the progress payment approval process. Final payment for the project will not be

released until the as-built documents are submitted and accepted by Bancroft as accurate and complete

7.2.15 Security – Bancroft is not responsible for the security of contractor's tools, materials, equipment, etc. It is the contractors' responsibility to keep all items secured

#### 8 SPECIFICATION CLARIFICATIONS

8.1 Additional Specification Clarifications will be handled through Addenda

#### 9 DRAWING CLARIFICATIONS

9.1 Additional Drawing Clarifications will be handled through Addenda

# 10 CONTRACT DRAWINGS & SPECIFICATIONS

10.1 The following drawings are hereby incorporated in to the contract documents:

10.1.1 100% Construction Documents Drawings dated 06/13/14.

- 10.2 The following specification manuals are hereby incorporated into the contract documents:
  - 10.2.1 100% Construction Documents Project Manual dated 06/30/14.

# 11 CONTRACT SCHEDULE / SEQUENCING

- 11.1 Reference the Project Master Schedule dated 06/30/14. The CPM project schedule includes sequenced turnover and phased completion for the base and alternate work i.e. the addition completes before the renovation work starts. Phased activities may occur currently, and non-sequentially. Contractor agrees to provide additional manpower/crews and mobilizations to account for concurrent and non-sequential activities for all project phases of the base and alternate work.
  - 11.1.1 Contractor Milestones

Reference the Project Master Schedule dated 06/30/14.

#### 12 LIQUIDATED DAMAGES

12.1 N/A

# 13 SUBCONTRACTORS

13.1 Subcontractors are to be identified as listed at the time of bid on the Bid Form.

#### 14 NOTES

14.1 Damages to any surface as a result of locating and/or removing contractor(s) supplied dumpsters, storage containers, materials, equipment, etc. will be repaired by the contractor responsible.

# SUMMARY OF WORK – PLUMBING, MECHANICAL, & ATC

# 15 ALLOWANCES / ALTERNATES / UNIT PRICES

- 15.1 Alternates
  - 15.1.1 Reference specification 012300 Alternates in the 100% Construction Documents Project Manual dated 06/30/14.

# SECTION 011000 - SUMMARY

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Project information.
  - 2. Work covered by Contract Documents.
  - 3. Phased construction.
  - 4. Work by Owner.
  - 5. Purchase contracts.
  - 6. Owner-furnished products.
  - 7. Contractor-furnished, Owner-installed products.
  - 8. Access to site.
  - 9. Coordination with occupants.
  - 10. Work restrictions.
  - 11. Specification and drawing conventions.
  - 12. Miscellaneous provisions.
- B. Related Requirements:
  - 1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

# 1.3 PROJECT INFORMATION

- A. Project Identification: Delaware Technical & Community College
  - 1. Project Location: 400 Stanton- Christina Road, Newark, DE 19713.
- B. Owner: Delaware Technical & Community Collage
  - 1. Owner's Representative: Ted Dwyer.
- C. Architect: BSA+A Architects.
- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

- 1. Landmark / JCM ; Civil Engineers / Landscape Architects
- 2. Macintosh Associates; Structural Engineers
- 3. Furlow Associates; MEP Engineers & Security and Technology
- 4. IT/ Multi-Media Consultants: Convergent Technologies

# 1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
  - 1. Renovations of two existing classrooms into a MicroBiology Laboratory and an Anatomy & Physiology Laboratory. The renovations will include some ceiling and finish renovations to the spaces below the labs on the first floor and will also include a new Roof Top Unit to serve the labs. The renovation work to the two classrooms will include new casework and finishes throughout, new ceilings and lighting, new partitions to create a Prep Room serving the MicroBiology Lab, as well as renovations to an existing storage room.
- B. Type of Contract:
  - 1. Project will be constructed under multiple prime contracts, with Bancroft Construction serving as the Construction Manager.

#### 1.5 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
  - 1. Owner's installation work for CCTV and security cameras.
- C. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
  - 1. Furniture Installation.

# 1.6 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

# 1.7 PURCHASE CONTRACTS

- A. General: Owner has negotiated purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum, unless otherwise indicated.
  - 1. Contractor's responsibilities are same as if Contractor had negotiated purchase contracts, including responsibility to renegotiate purchase and to execute final purchasing agreements.

# 1.8 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished product.
- B. Owner-Furnished Products:
  - 1. Equipment and Furniture listed in a separate document

# 1.9 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- C. 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 areas within the Contract limits any additional areas where work is permitted by owner.
  - 2. Driveways, Walkways and Entrances: Keep driveway, 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 storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

# 1.10 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize

conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's dayto-day operations. Maintain existing exits unless otherwise indicated.

- 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
- 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. 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 72 hours' notice to Owner of activities that will affect Owner's operations.
- C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
  - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
  - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
  - 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
  - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

# 1.11 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: RERFERENCE 00600 SPECIAL CONDITIONS

- 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 providing temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
  - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
  - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
  - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted on DTCC property.
- F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- H. 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.

#### 1.12 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. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. 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 published as part of the U.S. National CAD Standard and scheduled on Drawings.

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

# PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- B. Refer to provisions in AIA Document A201, GENERAL CONDITIONS OF THE CONTRACT, for requirements in addition to those specified in Division 1.
- C. For work being constructed under separate prime contracts, provisions of this Section apply to each contract.

# 1.02 REQUIREMENTS INCLUDED

- A. Process and implement Change Orders in accordance with schedule and procedures established in the contract documents.
- B. Designate in writing the member(s) of the Contractor's organization who:
  - 1. Is authorized to accept changes in the work.
  - 2. Is responsible for informing others in the Contractor's employ of the authorizing of changes in the work.
- C. The Owner will designate in writing his representative who is authorized to execute Change Orders.

# 1.03 RELATED REQUIREMENTS

A. Section 011520: Payment Procedures

#### 1.04 PRELIMINARY PROCEDURES

- A. Owner, Construction Manager, or Architect may initiate changes by submitting a Contract Modification Request to Contractor. Request will include:
  - 1. Detailed description of the change, products, and location of the change in the project.
  - 2. Supplementary or revised drawings and specifications.
  - 3. The projected time span for making the change, and a specific statement as to whether overtime work is, or is not, authorized.
  - 4. A specific period of time during which the requested price will be considered valid.
  - 5. Such request is for information only, and is not an instruction to execute the changes, nor to stop work in progress.
- B. Contractor may initiate changes by requesting the Architect to issue a Contract Modification Request. The Contractor's request shall contain:
  - 1. Description of the proposed changes.
  - 2. Statement of the reason for making the changes.
  - 3. Statement of the effect on the Contract Sum and the Contract Time.
  - 4. Statement of the effect on the work of separate Contractors.
  - 5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

#### **CHANGE ORDER PROCEDURES**

C. Format for Contract Modification Requests shall be as issued by the Construction Manager at the Pre-Construction meeting.

# 1.05 CHANGE ORDER AUTHORIZATION

- A. When the information in the Contract Modification Request is complete, it will be submitted to the Construction Manager for review and forwarded to the Architect and Owner.
- B. If the change is agreed to by the Owner, the Construction Manager will prepare a Change Order and forward it to the Contractor for signature. The Contractor will then return it to the Construction Manager, who will obtain authorization from the Owner. Once this authorization is received, the contract sum may be adjusted by entering the Change Order on the forms required in Section 01152, Payment Procedures.

# 1.06 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow CM/Architect and Owner to evaluate the quotation.
- B. On request provide additional data to support time and cost computations:
  - 1. Labor required.
  - 2. Equipment required.
  - 3. Products required.
    - a. Recommended source of purchase and unit cost.
    - b. Quantities required.
  - 4. Taxes, insurance and bonds.
  - 5. Credit for work deleted from contract, similarly documented.
  - 6. Overhead and profit.
  - 7. Justification for any change in Contract Time.
- C. Support each claim for additional costs, and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information:
  - 1. Name of the Owner's authorized agent who ordered the work, and date of the order.
  - 2. Dates and times work was performed, and by whom.
  - 3. Time record, summary of hours worked, and hourly rates paid.
  - 4. Receipts and invoices for:
    - a. Equipment used, listing dates and times of use.
    - b. Products used, listing of quantities.
    - c. Subcontracts.
- D. Refer to General Conditions of the Contract for other requirements.

#### PART 1 - GENERAL

#### 1.01 GENERAL PROVISIONS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- B. Where work is to be performed under separate prime contracts, provisions of this Section apply to each Contract.

#### 1.02 PRE-CONSTRUCTION MEETING

- A. Within one week after award of contract and/or upon notification by the Construction Manager, there will be a pre-construction meeting at the site. This will be attended by representatives of the Owner, the Architect, the Construction Manager and the Contractor.
- B. It shall be the responsibility of the Contractor to have in attendance representatives of his subcontractors and the person who will be the Contractor's superintendent on the project.
- C. The Construction Manager will have appropriate team members in attendance.
- D. The meeting minutes will be prepared by the Construction Manager and distributed to all in attendance.
- E. The purpose of this meeting is to establish the roles of participants in the construction process, including the Architect and design team, Construction Manager, the Owner, Contractors and Subcontractors, and to establish guidelines for the administration of the Construction Contract.

#### 1.03 PERIODIC PROGRESS MEETINGS

- A. Once a week, the Construction Manager will meet with the Contractor and other parties as either deems necessary to familiarize himself generally with the progress and quality of the work, and to determine in general if the work is proceeding in accordance with the Contract Documents.
- B. Minutes of meetings shall be prepared and distributed by the Construction Manager.
- C. All decisions, instructions, and interpretations given by the Architect, Construction Manager, Owner, or their representatives at these meetings shall be recorded in the minutes and if not corrected or amended when the minutes are read at the next subsequent meeting, shall be accepted by the Contractors as conclusive and final.

#### 1.04 SPECIAL MEETINGS

- A. Refer to other Sections of the Project Manual for additional information and requirements for other meetings, such as pre-roofing meeting and pre-caulking meeting.
- B. The Construction Manager will call these meetings as required.

# **8SECTION 012300 - ALTERNATES**

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

#### 1.3 DEFINITIONS

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

#### 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 ALTERNATES

- A. Alternate No. 1: Automatic Temperature Controls (ATC)
  - 1. Base Bid: Provide basis of design automatic temperature control system by Johnson Controls and installed by Modern Controls or approved equal manufacturer per Specification Section 230900 Automatic Temperature Control.
  - 2. Alternate: Provide basis of design automatic temperature control system by Johnson Controls and installed by Modern Controls.
- B. Alternate No. 2: Provide Basis of Design Fire Alarm System.
  - 1. Base Bid: Provide basis of design fire alarm system by Simples Grinnell or approved equal manufacturer per Specification Section 283115 Fire Alarm System.
  - 2. Alternate: Provide basis of design fire alarm system as provided and installed by Simplex Grinnell.

# SECTION 012500 - SUBSTITUTION PROCEDURES

# PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Division 01 Section "Alternates" for products selected under an alternate.
  - 2. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
  - 3. Divisions 02 through 33 Sections for specific requirements and limitations for substitutions.

#### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents 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 three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
  - 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, from ICC-ES.
- 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.
- 1. 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 within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
  - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - 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 15 days prior to time required for preparation and review of related submittals.
  - 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. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. 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: Not allowed unless otherwise indicated.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the commencement of the Work. 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.

- 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)

# **B S A** + **A**

# SUBSTITUTION REQUEST

| Project:  | Substitution Request Number:                |
|---|---|
|   | From:                                       |
| To:   | Date:                                       |
|   | A/E Project Number:                         |
| Re:   | Contract For:                               |
| Specification Title:                                    | Description:                                |
| Section: Page:  | Article/Paragraph:                          |
| Proposed Substitution:                                  |   |
| Manufacturer: Address:                                  | Phone:                                      |
| Trade Name:   | Model No.:                                  |
| Installer: Address:                                     | Phone:                                      |
| Differences between proposed substitution and specified |   |
| O'united Look III aligns                                |   |
| Similar Installation:                                   | Arabitaat                                   |
| Project:  |   |
| Autos   | Owner: Date Installed:                      |
| Proposed substitution affects other parts of Work:      | [] No [] Yes; explain                       |
| Savings to Owner for accepting substitution:            |   |
| Proposed substitution changes Contract Time: [] No      |   |
| Supporting Data Attached: [] Drawings [] Proc           | duct Data [] Samples [] Tests [] Reports [] |



# SUBSTITUTION REQUEST

The Undersigned certifies:

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

| Submitted by: |  |
|---------------|--|
| Signed by:    |  |
| Firm:         |  |
| Address:      |  |
|               |  |
| Telephone:    |  |
| Attachments:  |  |
|               |  |
|               |  |
|               |  |
|               |  |

#### A/E's REVIEW AND ACTION

[] Substitution approved - Make submittals in accordance with Specification Section 01330.

[] Substitution approved as noted - Make submittals in accordance with Specification Section 01330.

[] Substitution rejected - Use specified materials.

[] Substitution Request received too late - Use specified materials.

| Signed by:           |               |                  |             |                 | Date:  |    |
|----------------------|---------------|------------------|-------------|-----------------|--------|----|
| Additional Comments: | [] Contractor | [] Subcontractor | [] Supplier | [] Manufacturer | [] A/E | [] |
|                      |               |                  |             |                 |        |    |
|                      |               |                  |             |                 |        |    |
|                      |               |                  |             |                 |        |    |
|                      |               |                  |             |                 |        |    |
|                      |               |                  |             |                 |        |    |
|                      |               |                  |             |                 |        |    |

# SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

# PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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

#### 1.3 MINOR CHANGES IN THE WORK

A. 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 time specified in Proposal Request or 20 days, when not otherwise specified, 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 CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail." or forms acceptable to owner and / or 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 Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  - 7. Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail" or form acceptable to Owner and / or Architect.

# 1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

# 1.6 CHANGE ORDER PROCEDURES

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

# 1.7 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)

# SECTION 012900 - 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. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 2. Division 01 Section "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.
  - 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 days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.

- 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
- 5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract as described in Division 01 Section "Summary."
- 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 onehundredth 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.
    - a. Include separate line items under Contractor and principal subcontracts for LEED documentation and other Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
  - 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. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
- 10. 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-inplace may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
- 11. 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 30th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
  - 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. Application for Payment Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included in Project Manual.

- F. Application for Payment Forms: Use forms acceptable to Architect and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.
- G. 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.
- H. 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.
- I. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy 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.
- J. 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.
- K. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
  - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  - 2. When an application shows completion of an item, submit conditional final or full waivers.
  - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  - 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
- L. 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. Products list (preliminary if not final).
  - 5. Schedule of unit prices.
  - 6. Submittal schedule (preliminary if not final).
  - 7. List of Contractor's staff assignments.
  - 8. List of Contractor's principal consultants.
  - 9. Copies of building permits.
  - 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  - 11. Initial progress report.
  - 12. Report of preconstruction conference.
  - 13. Certificates of insurance and insurance policies.
  - 14. Performance and payment bonds.
  - 15. Data needed to acquire Owner's insurance.
- M. 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.
- N. 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. Evidence that claims have been settled.
- 7. 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.
- 8. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

# PART 1 - GENERAL

#### 1.01 GENERAL PROVISIONS

- A. The General Provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and DIVISION 1, as appropriate, apply to the Work specified in this Section
- B. Refer to the provisions of the Conditions of the Contract, for requirements in addition to those specified in DIVISION 1.
- C. The provisions of this section apply to all contracts.

#### 1.02 SECTION INCLUDES

- A. Pre-bid Construction Schedule.
- B. Construction Scheduling after award of contract.
- C. Adherence to schedule.
- D. Schedule Constraints
- E. Milestones

# 1.03 PRE-BID CONSTRUCTION SCHEDULE

- A. Because time is a critical element of this project, the Construction Manager has developed a construction schedule which is included in Division 0. By entering a bid each Contractor agrees to adhere to this schedule and to perform his work in conformity therewith.
- B. Due to Owner occupancy requirements, substantial completion (C of O) must occur no later than March 2, 2015.
- C. All contractors should include in their Base Bid all costs associated with working additional shifts if necessary to:
  - 1. Maintain the current project schedule and sequences of work;
  - 2. Work with and not impede the work of other trade contractors;
  - 3. Aggressively pursue their work to the satisfaction of the Owner.
- D. If the bidder believes, upon complete review of all aspects of the proposed project, that the bid schedule for his work is substantially in error, either too long or too short in duration, he shall notify the Construction Manager accordingly prior to submitting a bid.
- E. The Construction Manager will review schedule problems identified by bidders during the bid period, and any resulting schedule changes will be reflected in Addenda.
- F. The project schedule does not include allowances for events outside of the Contractor's control, as described in Article 8.3 of the General Conditions.

#### 1.04 CONSTRUCTION SCHEDULING AFTER AWARD OF CONTRACT

A. The work of each portion of the project will be monitored using a construction schedule prepared by the Construction Manager. The purpose is to provide a comprehensive planning tool to assure project completion on time.

- B. After award of contract, or issuance of a notice to award, the Construction Manager will meet with each Contractor to review the Contractor's detailed plans for performing his work within the framework of the project schedule and to coordinate these plans with those of the other Contractors on the project. Each Contractor's plan must be such as to permit other separate Contractors to perform their work on schedule. Detailed plans shall include work activities and durations, estimated manpower requirements for each activity on a weekly basis, and estimated delivery times for materials.
- C. Following the above meetings, the Construction Manager will further develop the Construction Schedule and will issue it to each contractor.
- D. Revisions to the Construction Schedule will be made only with the approval of the Construction Manager. The Construction Schedule will be updated and re-issued as required.
- E. The Construction Schedule will describe the sequence and duration of activities, not the scope. If there is a conflict related to scope between the Construction Schedule and the Contract Documents, the Contract Documents shall govern.

# 1.05 ADHERENCE TO THE SCHEDULE

- A. The Contractor understands and agrees that all work must be performed in an orderly and closely coordinated sequence so that the date for substantial completion may be met.
- B. The Contractor shall start each part of his work on the date designated for start in the Construction Schedule unless advised by the Construction Manager that the preceding activity is ahead or behind schedule. He shall carry the work forward expeditiously with adequate forces, equipment, and materials, and shall complete each part of his work on or before the date designated on the Project Schedule.
- C. If the Construction Manager determines that the Contractor is behind schedule, the Construction Manager shall have the right to require that the Contractor take steps to get the job on schedule. Such steps shall include increases in manpower, equipment and materials as the Construction Manager may deem necessary.
- D. After the work has begun, the Construction Manager may issue short interval schedules on a weekly or bi-weekly basis. The purpose of these schedules will be to project the work activities, adjust the Construction Schedule, and to inform each Contractor of changes in activities and durations.

# 1.06 LIQUIDATED DAMAGES

- A. Liquidated damages do not apply to this work.
- B. N/A
- 1.07 MILESTONE SCHEDULE

# **GENERAL MILESTONES**

Event -Award Contracts Around -Begin Work By Milestone August 11, 2014 September 25, 2014

**MILESTONE SCHEDULE** 

-Substantial Completion By

March 2, 2015

1.08 WORKING HOURS:

Mon-Friday 7:00AM – 3:30 PM.

B. Refer to Section 010110, SUMMARY OF THE WORK, for description of each Bid Package and Contract.

| 1         1         0         1         0         1         0   | Alli     | Allied Health - E Wing Lab Renovations       | ovations |              |                    |               | Bancroft Cor       | Bancroft Construction Company<br>BSA+A |
|---|----------|--|----------|--------------|--------------------|---------------|--------------------|--|
| 151         154         154         154         154         154         154         154         155 <th>₽</th> <th>Task Name</th> <th>Duration</th> <th>Start</th> <th></th> <th>% Comp Resour</th> <th>Half 2, 2014</th> <th></th>   | ₽        | Task Name                                    | Duration | Start        |                    | % Comp Resour | Half 2, 2014       |  |
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| Nonet         5 dep         None 30(61         F 9 422.41         2         0 cc           100.0000000000         3 dep         1 we 30216         1 we 30216         1 we 30216         1 we 30216           100         1 we 30014         1 we 30216         1 we 30216         1 we 30216         1 we 30216           100         1 we 30014         1 we 30216         1 we 30216         1 we 30216         1 we 10216           100         1 we 30014         1 we 30216         1 we 30216         1 we 10216         1 we 30216           100         1 we 30014           100         1 we 30014           100         1 we 30014           100         1 we 30014           100         1 we 30014           100         1 we 30014           100         1 we 30014         1 we 3  | 2        | BSA+A/BCC Review Bids                        | 15 days  | Mon 7/28/14  | Fri 8/15/14        | %0            |                    |  |
| (100 Controlment)         (5 ap)         (100 Controlment)         (5 ap)         (100 Controlment)         (2 ap)           100 Controlment         2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           <  | e        | DTCC Reviews and Approves Award              | 5 days   | Mon 8/18/14  |                    | %0            |                    |  |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   | 4        | BCC Issues Letter of Intent to Contractors   | 5 days   | Mon 8/25/14  |                    | %0            | •••••              |  |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   | 5        | Prepare and Issue PO's/Contracts             | 20 days  | Tue 9/2/14   |                    | %0            |                    |  |
| 00         10-00         10-000   | 9        | PROCUREMENT                                  | 70 days  | Tue 9/2/14   | Tue 12/9/14        | %0            |                    |  |
| 100hb         100hb <th< td=""><td>2</td><td>Submit on Long Lead Items</td><td>10 days</td><td>Tue 9/2/14</td><td></td><td>%0</td><td></td><td></td></th<>  | 2        | Submit on Long Lead Items                    | 10 days  | Tue 9/2/14   |                    | %0            |                    |  |
| 500%         Tra 3001         Tra 3014         Tra 3014 <thtra 3014<="" th="">         Tra 3014         <tht< td=""><td>œ</td><td>Review Long Lead Items</td><td>10 days</td><td>Tue 9/16/14</td><td></td><td>%0</td><td></td><td></td></tht<></thtra>  | œ        | Review Long Lead Items                       | 10 days  | Tue 9/16/14  |                    | %0            |                    |  |
| 30 days         Tes 30014         Mon 11/10/14         0 des           30 days         Tes 30014         Mon 11/20/14         0 des           30 days         Tes 30014         Mon 11/20/14         0 des           20 days         Tes 30014         Mon 10/20/14         0 des           13 days         Tes 30014         Mon 10/20/14         0 des           105 deserves         5 days         Tes 30014         Mon 30/20/14           105 deserves         5 days         Tes 30/14         Mon 30/20/14           105 deserves         5 days         Tes 30/14         Mon 30/20/14           105 deserves         5 days         Tes 30/14         Mon 30/20/14           105 deserves <td>6</td> <td>Roof Top Unit</td> <td>50 days</td> <td>Tue 9/30/14</td> <td></td> <td>%0</td> <td></td> <td></td>  | 6        | Roof Top Unit                                | 50 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 30 days         Tes 30041         Mon (17)(014         3         0%           30 days         Tes 30014         Mon (17)(01   | 10       | Exhaust Fans                                 | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 30 days         Tue 32014         Mon 11/014         5         05           30 days         Tue 32014         Mon 12/014         5         05           10 days         Tue 32014         Mon 12/014         5         05           10 days         Tue 32014         Mon 12/014         10  | 11       | CAV's & VAV's                                | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 30409         Tue 30014         Mon 1/20/14         S         Del           40505         Tue 30014         Mon 1/20/14         S         Del           40505         Tue 30014         Mon 1/20/14         Del         Del           30505         Tue 30014         Mon 1/20/14         Del         Del           30505         Tue 30014         Mon 1/20/14         Del         Del           30505         Tue 30014         Mon 1/20/14         Del         Del           20505         Tue 30014         Un 00/14  | 12       | GRD's  | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 40 days         1w 32014         Mon 172/414         S         Dis           20 days         1w 32014         Mon 172/414         S         Dis           20 days         1w 32014         Mon 172/414         Dis         Dis           20 days         1w 32014         Mon 171/014         Dis         Dis           10 days         1w 32014         Mon 171/014         Dis         Dis           11 days         1w 32014         Mon 171/014         Dis         Dis           10 days         1w 32014         Mon 171/014         Dis         Dis           10 days         1w 32014         Mon 171/014         Dis         Dis           10 days         1w 32014         Mon 120144         Dis         Dis           10 days         1w 32014         Mon 120144         Dis         Dis           10 days         1w 32014         Mon  | 13       | Sound Attenuation                            | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 40 disp         1cs 92014         Min 1/24/14         9         06           20 disp         1cs 92014         Min 1/10/14         8         06           13/ disp         1rs 92014         Min 1/10/14         8         06           00 disp         13/ disp         1rs 92014         Min 1/10/14         10           01 disp         13/ disp         1rs 92014         Min 1/10/14         12           01 disp         1rs 92014         Min 1/10/14         12         06           01 disp         1rs 92014         Min 1/10/14         12         06           01 disp         1rs 92014         Min 1/10/14         12         06           01 disp         1rs 92014         Min 1/1   | 14       | Ventilation Hood                             | 40 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days         Tue 32014         Mm 1/10101         8         0%           60 days         Tue 820014         Mm 1/10101         8         0%           70 days         Tue 820014         Mm 1/20114         8         0%           70 days         Tue 82014         Mm 1/2014         14         0%           70 days         Tue 82014         Mm 1/2014         14         0%           70 days         Tue 82014         Mm 1/2014         14         0%           70 days         Tue 82014         Mm 1/2014         14 <td>15</td> <td>Autoclave</td> <td>40 days</td> <td>Tue 9/30/14</td> <td></td> <td>%0</td> <td></td> <td></td>   | 15       | Autoclave                                    | 40 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 30 days         Tue 320/1         Mon 1/10/14         8         0%           20 days         Tue 320/14         Mon 1/10/14         8         0%           20 days         Tue 320/14         Mon 1/27/14         8         0%           20 days         Tue 320/14         Mon 1/27/14         8         0%           20 days         Tue 920/14         Mon 1/27/14         8         0%           20 days         Tue 920/14         Mon 1/27/14         8         0%           12 days         Tue 920/14         Mon 1/27/14         10         0%           12 days         Tue 920/14         Mon 1/27/14         10         0%           12 days         Tue 920/14         Mon 1/97/14         10         0%           10 days         Kould days         Tue 920/14         Mon 1/97/14         10           10 days         Kould days         Tue 920/14         Mon 1/97/14         10           10 days         Kould days  | 16       | Plumbing Fixtures                            | 30 days  | Tue 9/30/14  | Mon 11/10/14 8     | %0            |                    |  |
| 50 days         Tue 320/14         Tue 320/14         Tue 320/14         Non 1027/14         B         0%           20 days         Tue 930/14         Mon 1027/14         B         0%         0%           20 days         Tue 930/14         Mon 1027/14         B         0%         0%           30 days         Tue 930/14         Mon 1027/14         B         0%         0%           30 days         Tue 930/14         Mon 11/20/14         B         0%         0%           30 days         Tue 930/14         Mon 11/20/14         B         0%         0%           30 days         Tue 930/14         Mon 11/20/14         B         0%         0%           173 days         Tue 930/14         Mon 10/20/14         B         0%         0%           0 days         Tue 930/14         Mon 10/20/14         1/4         0%         0%           0 days         Tue 930/14         Mon 10/20/14         1/4         0%         0%           0 days         Tue 930/14         Mon 10/20/14         1/4         0%         0%           0 days         Tue 930/14         Mon 10/20/14         1/4         0%         0%           0 days         Wod 10/20/14   | 17       | Panelboard                                   | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days     Tue 93014     Mon 102714     8     0%       20 days     Tue 93014     Mon 102714     8     0%       20 days     Tue 93014     Mon 102714     8     0%       10 days     Tue 93014     Mon 102714     8     0%       10 days     Tue 93014     Mon 112214     8     0%       11 days     Tue 93014     Mon 112214     8     0%       11 days     Tue 93014     Mon 112214     8     0%       11 days     Tue 93014     Mon 10214     1     0%       11 days     Tue 93014     Mon 10214     4     0%       11 days     Tue 93014     Mon 10614     40     0%       11 days     Tue 93014     Mon 10614     40     0%       11 days     Tue 93014     Mon 10614     40     0%       11 days     Tue 93014     Tue 10714     1     1     0%       11 days     Une 10214     Tue 10714     1     1     0%       11 days     Une 10214     Tue 10214     1     1     0%       11 days     Wed 10754     Tue 10214     1     1     0%       11 days     Wed 10754     Tue 102244     44     0%       11 days     Wed 107541   | 18       | Lighting                                     | 50 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days     Tue 920/14     Mon 1027/14     8     0%       22 days     Tue 920/14     Mon 1027/14     8     0%       22 days     Tue 920/14     Mon 1027/14     8     0%       147 days     Tue 920/14     Mon 1027/14     8     0%       157 days     Tue 920/14     Mon 1027/14     8     0%       160     127 days     Tue 920/14     Mon 1027/14     8     0%       161     127 days     Tue 920/14     Mon 302/14     4     0%       161     127 days     Tue 920/14     Mon 302/14     14     0%       161     5 days     Tue 920/14     Mon 302/14     14     0%       161     5 days     Tue 920/14     Mon 106/14     14     0%       161     114     114     14     0%     0%       161     114     116     114     116     0%       161     114     116     114     114     114     0%       161     114     116     116     0%     0%       161     116     116     116     0%     0%       161     114     116     116     0%     0%       161     116     116     116     0% <td>19</td> <td>ACT</td> <td>20 days</td> <td>Tue 9/30/14</td> <td></td> <td>%0</td> <td></td> <td></td>  | 19       | ACT  | 20 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days         Tue 92014         Mon 1077/14         8         0/6           10 days         Tue 92014         Mon 1172/14         8         0/6           11 days         Tue 92014         Mon 106/14         4         0/6           11 days         Wed 10/15/14         Tue 10/28/14         4         0/6           11 days         Wed 10/15/14         Tue 10/28/14         4         0/6           11 days         Wed 10/15/14         Tue 10/28/14         4         0/6           Mones as Required         10 days         Wed 10/15/14         1         0/6           Mones as Required         10 days   | 20       | Resinous Flooring                            | 20 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days     Tue 32014     Mon 11/1014     8     06       14 days     Tue 32014     Mon 11/1014     8     06       15 days     Tue 32014     Mon 37/615     06       16 days     Tue 32014     Mon 37/615     06       17 days     Tue 32014     Mon 37/615     06       16 days     Tue 32014     Mon 10/614     40     06       16 days     Tue 92014     Mon 10/614     40     06       16 days     Tue 92014     Mon 10/614     41     06       16 days     Ure 92014     Mon 10/614     106     06       16 days     Wed 10/1514     Tue 10/2144     41     06       16 min as Required     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       17 Molts     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106 <t< td=""><td>21</td><td>VCT</td><td>20 days</td><td>Tue 9/30/14</td><td>Mon 10/27/14 8</td><td>%0</td><td></td><td></td></t<>  | 21       | VCT  | 20 days  | Tue 9/30/14  | Mon 10/27/14 8     | %0            |                    |  |
| 40 days     Tue 92014     Mon 11/24/14     8     0%       117 days     197 days     Tue 92014     Mon 11/24/14     8     0%       1010     137 days     Tue 92014     Mon 11/24/14     8     0%       1010     137 days     Tue 92014     Mon 10/6/14     0%     0%       1013     Editorys     5 days     Tue 92014     Mon 10/6/14     14.0     0%       103     Urday     Urday     Wed 10/5/14     Tue 10/7/14     14.2     0%       00100     Work     5 days     Wed 10/5/14     Tue 10/2/14     44     0%       00100     Work     5 days     Wed 10/5/14     Tue 10/2/14     44     0%       00100     Work     5 days     Wed 10/5/14     Tue 10/2/14     44     0%       00100     Work     10 days     Wed 10/5/14     Tue 10/2/14     44     0%       00100     Work     10 days     Wed 10/5/14     Tue 10/2/14     44     0%       00100     Work     10 days     Wed 10/5/14     Tue 10/2/14     44     0%       00100     Work     10 days     Wed 10/5/14     Tue 10/2/14     44     0%       00100     Work     10 days     Wed 10/5/14     Tue 10/2/14     44<   | 22       | Wood Doors                                   | 30 days  | Tue 9/30/14  | Mon 11/10/14 8     | %0            |                    |  |
| It days         Tue 92/14         Non 316/15         0%         0%           nhue         137 days         Tue 92/14         Non 316/15         0%         0%           nhue         137 days         Tue 92/14         Non 326/14         0%         0%           nhue         2 days         Tue 92/14         Non 106/14         140         0%           ng C Gelings         5 days         Tue 92/14         Non 106/14         140         0%           sints Required         5 days         Wed 10/15/14         Tue 10/23/14         143         0%           Nons Required         5 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%      <  | 23       | Laboratory Casework                          | 40 days  | Tue 9/30/14  |                    | %0            |                    |  |
| Ist days         Tue 92/14         Mon 316/15         004           mure         20 days         Tue 92/14         Mon 316/15         004           ing & Cellings         2 days         Tue 92/14         Mon 106/14         40         0%           ing & Cellings         5 days         Tue 93/014         Mon 106/14         40         0%           Sints         1 day         Wei 106/14         Tue 10/214         141-22         0%           Softop Work         5 days         Wei 10/714         Tue 10/214         141-22         0%           Softop Work         5 days         Wei 10/15/14         Tue 10/2144         141-20         0%           Softop Work         5 days         Wei 10/15/14         Tue 10/23/14         144         0%           Menical Piping         10 days         Wei 10/15/14         Tue 10/23/14         144         0%           Menical Piping         10 days         Wei 10/21/14         Tue 10/23/14         144         0%           Menical Duct         10 days         Wei 10/21/14         Tue 10/23/14         144         0%           Menical Duct         10 days         Wei 10/21/14         Tue 10/23/14         144         0%           Meninalist         10   | 24       | CONSTRUCTION                                 | 137 days | Tue 9/2/14   | Mon 3/16/15        | %0            |                    |  |
| Intere         20 days         Tue 92/14         Mon 92/3/14         4         0%           ing & Cellings         5 days         Tue 92/0/14         Mon 10/6/14         40         0%           ing & Cellings         5 days         Tue 92/0/14         Mon 10/6/14         40         0%           is         1 day         Tue 10/7/14         Tue 10/7/14         14/2         0%           is         Not 10/6/14         Tue 10/7/14         14/4         0%         0%           is         Not 10/6/14         Tue 10/2/7/14         1/4         0%         0%           is         Noed 10/6/14         Tue 10/2/7/14         1/4         0%         0%           Memorial Poing         10 days         Weed 10/6/14         1/4         0%         0%           Memorial Poing         10 days         Weed 10/16/14         1/4         1/4         0%           Memorial Duct         10 days         Weed 10/16/14         1/4         0%         0%           Mechanical Duct         10 days         Weed 10/16/14         1/4         0%         0%           Mechanical Duct         10 days         Weed 10/16/14         1/4         1/4         0%           Mechanical Duct         <  | 39       | 2nd Floor Renovations                        | 137 days | Tue 9/2/14   | Mon 3/16/15        | %0            |                    |  |
| ring & Cellings     5 days     Tue 9/2014     Mon 10/6/14     40     0%       ring     5 days     Tue 9/2014     Mon 10/6/14     14/2     0%       ring     1 day     Tue 10/7/14     Tue 10/7/14     1/4/2     0%       ring     1 days     Wed 10/1/14     Tue 10/2/14     1/4/2     0%       ring     ring     Wed 10/1/14     Tue 10/2/14     1/4/2     0%       ring     Wed 10/1/14     Tue 10/2/14     1/4     1/4     0%       Misins     Required     1 0 days     Wed 10/1/14     1/4     1/4     0%       Misins     Required     1 0 days     Wed 10/1/14     1/4     1/4     0%       Mechanical Duct     1 0 days     Wed 10/1/14     1/4     1/4     0%       Mechanical Duct     1 0 days     Wed 10/2/14     1/14/14     1/4     0%       Mechanical Duct     1 0 days     Wed 10/2/14     1/14/14     1/14     0%       Mechanical Duct     1 0 days     Wed 10/2/14     1/14/14     1/14     0%       Mechanical Duct     1 0 days     Wed 10/2/14     1/14/14     1/14     0%       Mechanical Duct     1 0 days     Wed 10/2/14     1/14/14     1/14       Mechanical Duct     1 0 days  | 40       | DTCC Move out Furniture                      | 20 days  | Tue 9/2/14   | Mon 9/29/14 4      | %0            |                    |  |
| Statistic         Tue 9/3/14         Mon 10/6/14         40         0%           R         1 day         Tue 10/7/14         Tue 10/7/14         14/2         0%           Rootop Work         5 days         Wed 10/8/14         Tue 10/7/14         14/2         0%           Ator         1 day         Tue 10/7/14         Tue 10/7/14         14/2         0%           Ator         5 days         Wed 10/8/14         Tue 10/2/14         44         0%           Mins as Required         5 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         5 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         5 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         1 0 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         1 0 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         1 0 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         1 0 days         Wed 10/5/14         Tue 10/2/14         44         0%  | 41       | Demo Existing Flooring & Ceilings            | 5 days   | Tue 9/30/14  | Mon 10/6/14 40     | %0            |                    |  |
| B         1 day         Tue 10/7/14         Tue 10/2/7/14         Tue 10/2/7/7         Tue 10/  | 42       | Demo MEP                                     | 5 days   | Tue 9/30/14  | Mon 10/6/14 40     | %0            |                    |  |
| Controp Work         5 days         Wed 10/8/14         Tue 10/28/14         Tue 10/28/14         1 et 10/28/14         4 et 10%         0%           Unbs. Roof Curtbs. Temp Protect         10 days         Wed 10/15/14         Tue 10/28/14         4 et 0%         0%           Mains as Required         5 days         Wed 10/15/14         Tue 10/28/14         1 et 0/28/14         4 et 0%         0%           Mechanical Piping         10 days         Wed 10/15/14         Tue 10/28/14         1 et 0/28/14         4 et 0%         0%           Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         1 et 0/28/14         4 et 0%         0%           Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         1 et 10/28/14         4 et 0%         0%           Mechanical Duct         10 days         Wed 10/27/14         Tue 10/28/14         1 et 10/28/14         4 et 0%         0%           Mechanical Duct         10 days         Wed 10/27/14         Tue 10/28/14         1 et 10/28/14<  | 43       | Layout Wall Partitions                       | 1 day    | Tue 10/7/14  | Tue 10/7/14 41,42  | %0            |                    |  |
| Untras, Temp Protect       10 days       Wed 10/15/14       Tue 10/28/14       Tue 10/28/14       44       0%         Mains as Required       5 days       Wed 10/15/14       Tue 10/28/14       Tue 10/28/14       44       0%         Mechanical Pping       10 days       Wed 10/15/14       Tue 10/28/14       Tue 10/28/14       44       0%         Plumbing       10 days       Wed 10/15/14       Tue 10/28/14       14       0%       Pin         Flectrical       10 days       Wed 10/15/14       Tue 11/14/14       44       0%       Pin         Mechanical Duct       10 days       Wed 10/15/14       Tue 11/14/14       46       0%       Pin         Mechanical Duct       2 days       Wed 10/29/14       Tun 11/16/14       52       0%       Pin         Mells       5 days       Fri 10/31/14       Tun 11/16/14       52       0%       Pin         Nualls       5 days       Fri 10/31/14       Tun 11/16/14       53.54       0%       Pin         Nualls       5 days       Fri 10/31/14       Tun 11/16/14       53.54       0%       Pin         Nualls       5 days       Fri 10/31/14       Tun 11/16/14       53.54       0%       Pin         Nu   | 44       | Add Misc. Steel for Rooftop Work             | 5 days   | Wed 10/8/14  | Tue 10/14/14 43    | %0            |                    |  |
| Mains as Required         5 days         Wed 10/15/14         Tue 10/28/14         4         0%         0%           Mechanical Pping         10 days         Wed 10/15/14         Tue 10/28/14         44         0%         Pin           Mechanical Pping         10 days         Wed 10/15/14         Tue 10/28/14         44         0%         Pin           Plumbing         10 days         Wed 10/15/14         Tue 11/28/14         44         0%         Pin           Rectanical Duct         10 days         Wed 10/28/14         Tue 11/28/14         66         0%         Pin           Mechanical Duct         2 days         Wed 10/28/14         Tuu 10/30/14         Fin 10/30/14         Fin 10/30/14         Pin         0%         Pin           Nalls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         N         N           Nalls         5 days         Fri 11/7/14         7hu 11/6/14         52         0%         N         N         D           Nalls         5 days         Fri 11/7/14         Nu 11/6/14         52         0%         N         D         N           Nalls         Forestrain         Nu 11/6/14         53.4         0%         N         <  | 45       | Demo Roof, Install Curbs, Roof Curbs, Temp F |          | Wed 10/15/14 | Tue 10/28/14 44    | %0            |                    |  |
| Mechanical Pping         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Flectrical         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Mechanical Duct         10 days         Wed 10/22/14         Tue 11/4/14         46         0%         1           Mechanical Duct         2 days         Wed 10/22/14         Tuu 11/6/14         52         0%         1           Nalls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           Nalls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           Nalls         5 days         Fri 10/31/14         17,01/14         53,54         0%         1           Nalls         5 days         Fri 10/31/14         17,01/14         53,54         0%         1           Nalls         5 days         Fri 10/31/14         17,01/14         53,54         0%         1           Isht         Ma  | 46       | Relocated Sprinkler Mains as Required        | 5 days   | Wed 10/15/14 | Tue 10/21/14 44    | %0            |                    |  |
| Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Electrical         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Mechanical Duct         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Mechanical Duct         10 days         Wed 10/22/14         Tue 10/28/14         14         0%           Mechanical Duct         10 days         Wed 10/22/14         Tue 10/30/14         51         0%           Nualis         5 days         Fri 10/31/14         Tun 11/6/14         52         0%         1           Nualis         5 days         Fri 10/31/14         Tun 11/6/14         52         0%         1           Nualis         5 days         Fri 10/31/14         Tun 11/6/14         52         0%         1           Nualis         5 days         Fri 10/31/14         S3.54         0%         0%         1           Isster         Task         Milestone         0%         1         1         1           Nalis         Project Summary         Milestone         1         1         1         1         1         1         1         1         1  | 49       | Rough-in Overhead Mechanical Piping          | 10 days  | Wed 10/15/14 | Tue 10/28/14 44    | %0            |                    |  |
| Electrical       10 days       Wed 10/15/14       Tue 10/28/14       44       0%       1         Mechanical Duct       10 days       Wed 10/22/14       Tue 11/4/14       46       0%       1         Mechanical Duct       2 days       Wed 10/29/14       Thu 10/30/14       51       0%       1         N Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Malls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Malls       5 days       Fri 10/31/14       Thu 11/13/14       53,54       0%       1         Itsk       Mechanical Tasks       Micean       Simmary       Micean       1         Itsk       Micean       Micean       Micean       Micean       1         Split       Micean       Micean       Micean       Micean       Micean  | 50       | Rough-in Overhead Plumbing                   | 10 days  | Wed 10/15/14 |                    | %0            |                    |  |
| Mechanical Duct         10 days         Wed 10/22/14         Tue 11/4/14         46         0%         1           Mechanical Duct         2 days         Wed 10/29/14         Thu 10/30/14         51         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/13/14         53.54         0%         1           n Walls         5 days         Fri 11/7/14         Thu 11/13/14         53.54         0%         1           Task         Milestone         Progress         External Milestone         1         1   | 51       | Rough-in Overhead Electrical                 | 10 days  | Wed 10/15/14 | Tue 10/28/14 44    | %0            |                    |  |
| n Walls       2 days       Wed 10/29/14       Thu 10/30/14       51       0%         n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         alls       5 days       Fn 11/7/14       Thu 11/13/14       53,64       0%         Itsk       model       Nogress       Summary       External Tasks       Deadine         Split       munum       Milestone       Project Summary       Project Summary       Project Summary       Project Summary   | 47       | Rough-in Overhead Mechanical Duct            | 10 days  | Wed 10/22/14 | Tue 11/4/14 46     | %0            |                    |  |
| n Walls 5 days Fri 10/31/14 Thu 11/6/14 52 0% 1<br>N Walls 5 days Fri 10/31/14 Thu 11/6/14 52 0% 1<br>alls 5 days Fri 11/7/14 Thu 11/13/14 52 0% 2<br>alls 7 days Fri 11/7/14 Thu 11/13/14 53,64 0% 2<br>Task 7 model and 11/13/14 Thu 11/13/14 7<br>Progress 7 model and 11/14 7 | 52       | Frame Interior Walls                         | 2 days   | Wed 10/29/14 | Thu 10/30/14 51    | %0            |                    |  |
| n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         alls       5 days       Fri 11/7/14       Thu 11/13/14       52,54       0%       Image: Comparison of the standard state of the   | 53       | Rough-in Plumbing in Walls                   | 5 days   | Fri 10/31/14 | Thu 11/6/14 52     | %0            |                    |  |
| alls 5 days Fri 11/7/14 Thu 11/13/14 S3,54 0% Task Task Fri 11/7/14 Thu 11/13/14 S3,54 0% Task Friend   | 54       | Rough-in Electrical in Walls                 | 5 days   | Fri 10/31/14 | Thu 11/6/14 52     | %0            |                    |  |
| Task     Progress     External Tasks     Deadline       Split     Milestone     Project Summary     External Milestone     Project Summary  | 55       | Install Backing in Walls                     | 5 days   | Fri 11/7/14  | Thu 11/13/14 53,54 | %0            |                    |  |
| Split Milestone Project Summary   | Project: |  | Progress |              | Summary            |               | Deadline           |  |
|   | Date: 0  | Split  |          | •            | Project Summary    |               | External Milestone |  |
|   |          |  |          |              | Pade 1             |               |                    |  |

| ID Task Name                         | le  |                   | Duration              | Start                 | Finish Pred                |             | % Comp Resource                      | Half 2, 2014 |          |
|--------------------------------------|---|-------------------|-----------------------|-----------------------|----------------------------|-------------|--------------------------------------|--------------|----------|
|                                      | Hand \/4\/'s and C4\/'s   |                   | 3 dave                | Tile 11/11/14         | /13/14                     |             |                                      |              | Qtr 1    |
|                                      |   | 0                 | o udys                | 1 I I I I I I I I I I |                            |             |                                      |              |          |
|                                      | Insulate Walls  |                   | 2 days                | Fri 11/14/14          | Mon 11/17/14 55            |             |                                      |              |          |
| 57                                   | Wall Close-in Inspection  | tion              | 3 days                | Tue 11/18/14          |                            |             | .0                                   |              |          |
| 58                                   | Hang GWB Walls  |                   | 3 days                | Fri 11/21/14          | Tue 11/25/14 57            | %0          |                                      |              |          |
| . 20                                 | Tape & Finish Walls   |                   | 5 days                | Wed 11/26/14          | Wed 12/3/14 58             | %0          |                                      |              |          |
| 60                                   | Patch & Repair Existing Walls   | ing Walls         | 5 days                | Wed 11/26/14          | Wed 12/3/14 58             | %0          | .0                                   |              |          |
| 61                                   | Prime & Paint Walls   |                   | 3 days                | Thu 12/4/14           | Mon 12/8/14 60             | %0          |                                      |              |          |
| 63                                   | Install Acoustical Ceiling Grid                                       | ling Grid         | 5 days                | Tue 12/9/14           | Mon 12/15/14 10,61         | ,61 0%      |                                      |              |          |
| 62                                   | Set RTU   |                   | 1 day                 | Wed 12/10/14          | Wed 12/10/14 9             | %0          |                                      | <b>)</b>     |          |
| 64                                   | Install Sprinkler Drops in ACT  | s in ACT          | 5 days                | Tue 12/16/14          | Mon 12/22/14 63            | %0          |                                      |              |          |
| 65                                   | Install Mechanical in ACT   | ACT               | 10 days               | Tue 12/16/14          | Tue 12/30/14 63            | %0          |                                      |              |          |
| 66                                   | Install Electrical in ACT   | х                 | 10 days               | Tue 12/16/14          | Tue 12/30/14 63            | %0          |                                      |              |          |
| 67                                   | Above Ceiling Inspection & Completion                                 | tion & Completion | 3 days                | Wed 12/31/14          | Mon 1/5/15 64,             | 64,65,66 0% |                                      |              |          |
| 68                                   | Drop Ceiling Tiles  |                   | 2 days                | Tue 1/6/15            | Wed 1/7/15 67              | %0          |                                      |              |          |
| 69                                   | Install Resinous Flooring   | ring              | 10 days               | Thu 1/8/15            | Wed 1/21/15 68             | %0          |                                      |              |          |
| 70                                   | Install MEP Trim  |                   | 5 days                | Thu 1/22/15           | Wed 1/28/15 69             | %0          |                                      |              |          |
| 71                                   | Install Doors & Hardware  | vare              | 5 days                | Thu 1/22/15           | Wed 1/28/15 69             | %0          |                                      |              |          |
| 72                                   | Install Lab Casework  |                   | 10 days               | Thu 1/22/15           | Wed 2/4/15 69              | %0          |                                      |              |          |
| 74                                   | Install Specialties   |                   | 5 days                | Thu 1/29/15           | Wed 2/4/15 70              | %0          |                                      |              |          |
| 75                                   | Install Owner Furnished Equipment                                     | led Equipment     | 10 days               | Thu 1/29/15           | Wed 2/11/15 70             | %0          | 10                                   |              |          |
| 73                                   | Install Plumbing Fixtures   | ILES              | 5 days                | Thu 2/5/15            | Wed 2/11/15 72             | %0          |                                      |              |          |
| 76                                   | Install Base  |                   | 2 days                | Thu 2/12/15           | Fri 2/13/15 75             | %0          |                                      |              |          |
|                                      | Test, Adjust, & Balance   | Ce                | 8 days                | Mon 2/16/15           | Wed 2/25/15 76             | %0          | 20                                   |              |          |
| 78                                   | Final Inspections   |                   | 3 days                | Thu 2/26/15           | Mon 3/2/15 77              | %0          |                                      |              |          |
| 19                                   | Punchlist   |                   | 10 days               | Tue 3/3/15            | Mon 3/16/15 78             | %0          | 10                                   |              |          |
| 25 1st F                             | Floor Renovations   |                   | 53 days               | Fri 10/31/14          | Fri 1/16/15                | %0          |                                      |              | ľ        |
| 26                                   | Coredrill SOD for Plumbing Rough-in                                   | mbing Rough-in    | 1 day                 | Fri 10/31/14          | Fri 10/31/14 52            | %0          |                                      |              |          |
| 27                                   | DTCC Move Out Furniture   | niture            | 5 days                | Mon 11/17/14          | Fri 11/21/14               | %0          |                                      |              |          |
| 28                                   | Build Temporary Partitions  | itions            | 2 days                | Mon 11/17/14          | Tue 11/18/14 27SS          | SS 0%       | 1.0                                  |              |          |
| 29                                   | Demo 1st Floor ACT & Lights   | & Lights          | 3 days                | Wed 11/19/14          | Fri 11/21/14 28            | %0          | 10                                   |              |          |
| 30                                   | Sawcut & Patchback SOG for Plumbing                                   | SOG for Plumbing  | 4 days                | Mon 11/24/14          | Fri 11/28/14 29            | %0          |                                      |              |          |
| 31                                   | Overhead Plumbing Rough-in  | Rough-in          | 15 days               | Mon 12/1/14           | Fri 12/19/14 30            | %0          | .0                                   |              |          |
| 32                                   | Install ACT   |                   | 3 days                | Mon 12/22/14          | Wed 12/24/14 31            | %0          |                                      |              |          |
| 33                                   | Install Lighting  |                   | 4 days                | Fri 12/26/14          | Wed 12/31/14 32            | %0          | 10                                   |              |          |
| 34                                   | Install VCT   |                   | 3 days                | Fri 1/2/15            | Tue 1/6/15 33              | %0          |                                      |              |          |
| 35                                   | Drop Ceiling Tiles  |                   | 1 day                 | Wed 1/7/15            | Wed 1/7/15 34              | %0          |                                      |              | <b>)</b> |
| 36                                   | Painting Touch-up   |                   | 2 days                | Thu 1/8/15            | Fri 1/9/15 35              | %0          |                                      |              | <b>)</b> |
| 37                                   | Final Inspections   |                   | 3 days                | Mon 1/12/15           | Wed 1/14/15 36             | %0          |                                      |              | •        |
| 38                                   | Cleanup   |                   | 2 days                | Thu 1/15/15           | Fri 1/16/15 37             | %0          |                                      |              | <b></b>  |
|                                      |   |                   |                       |                       |                            |             |                                      |              | ſ        |
| iject: E Wing La<br>ase: Constructic | Project: E Wing Lab Renovation<br>Phase: Construction Master Schedule | Task              | Progress<br>Milestone |                       | Summary<br>Proiact Summary |             | External Tasks<br>External Milestone | Deadline     | 7        |
| 1-07-10-21                           |   |                   |                       |                       |                            |             |                                      |              |          |

# PART 1 - GENERAL

#### 1.01 GENERAL PROVISIONS

- A. The General Provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and DIVISION 1, as appropriate, apply to the Work specified in this Section
- B. Refer to the provisions of the Conditions of the Contract, for requirements in addition to those specified in DIVISION 1.
- C. The provisions of this section apply to all contracts.

#### 1.02 SECTION INCLUDES

- A. Pre-bid Construction Schedule.
- B. Construction Scheduling after award of contract.
- C. Adherence to schedule.
- D. Schedule Constraints
- E. Milestones

# 1.03 PRE-BID CONSTRUCTION SCHEDULE

- A. Because time is a critical element of this project, the Construction Manager has developed a construction schedule which is included in Division 0. By entering a bid each Contractor agrees to adhere to this schedule and to perform his work in conformity therewith.
- B. Due to Owner occupancy requirements, substantial completion (C of O) must occur no later than March 2, 2015.
- C. All contractors should include in their Base Bid all costs associated with working additional shifts if necessary to:
  - 1. Maintain the current project schedule and sequences of work;
  - 2. Work with and not impede the work of other trade contractors;
  - 3. Aggressively pursue their work to the satisfaction of the Owner.
- D. If the bidder believes, upon complete review of all aspects of the proposed project, that the bid schedule for his work is substantially in error, either too long or too short in duration, he shall notify the Construction Manager accordingly prior to submitting a bid.
- E. The Construction Manager will review schedule problems identified by bidders during the bid period, and any resulting schedule changes will be reflected in Addenda.
- F. The project schedule does not include allowances for events outside of the Contractor's control, as described in Article 8.3 of the General Conditions.

#### 1.04 CONSTRUCTION SCHEDULING AFTER AWARD OF CONTRACT

A. The work of each portion of the project will be monitored using a construction schedule prepared by the Construction Manager. The purpose is to provide a comprehensive planning tool to assure project completion on time.

- B. After award of contract, or issuance of a notice to award, the Construction Manager will meet with each Contractor to review the Contractor's detailed plans for performing his work within the framework of the project schedule and to coordinate these plans with those of the other Contractors on the project. Each Contractor's plan must be such as to permit other separate Contractors to perform their work on schedule. Detailed plans shall include work activities and durations, estimated manpower requirements for each activity on a weekly basis, and estimated delivery times for materials.
- C. Following the above meetings, the Construction Manager will further develop the Construction Schedule and will issue it to each contractor.
- D. Revisions to the Construction Schedule will be made only with the approval of the Construction Manager. The Construction Schedule will be updated and re-issued as required.
- E. The Construction Schedule will describe the sequence and duration of activities, not the scope. If there is a conflict related to scope between the Construction Schedule and the Contract Documents, the Contract Documents shall govern.

# 1.05 ADHERENCE TO THE SCHEDULE

- A. The Contractor understands and agrees that all work must be performed in an orderly and closely coordinated sequence so that the date for substantial completion may be met.
- B. The Contractor shall start each part of his work on the date designated for start in the Construction Schedule unless advised by the Construction Manager that the preceding activity is ahead or behind schedule. He shall carry the work forward expeditiously with adequate forces, equipment, and materials, and shall complete each part of his work on or before the date designated on the Project Schedule.
- C. If the Construction Manager determines that the Contractor is behind schedule, the Construction Manager shall have the right to require that the Contractor take steps to get the job on schedule. Such steps shall include increases in manpower, equipment and materials as the Construction Manager may deem necessary.
- D. After the work has begun, the Construction Manager may issue short interval schedules on a weekly or bi-weekly basis. The purpose of these schedules will be to project the work activities, adjust the Construction Schedule, and to inform each Contractor of changes in activities and durations.

# 1.06 LIQUIDATED DAMAGES

- A. Liquidated damages do not apply to this work.
- B. N/A
- 1.07 MILESTONE SCHEDULE

# **GENERAL MILESTONES**

Event -Award Contracts Around -Begin Work By Milestone August 11, 2014 September 25, 2014

**MILESTONE SCHEDULE** 

-Substantial Completion By

March 2, 2015

1.08 WORKING HOURS:

Mon-Friday 7:00AM – 3:30 PM.

B. Refer to Section 010110, SUMMARY OF THE WORK, for description of each Bid Package and Contract.

END OF SECTION 013100

| 1         1         0         1         0         1         0   | Alli     | Allied Health - E Wing Lab Renovations       | ovations |              |                    |               | Bancroft Cor       | Bancroft Construction Company<br>BSA+A |
|---|----------|--|----------|--------------|--------------------|---------------|--------------------|--|
| 151         154         154         154         154         154         154         154         155 <th>₽</th> <th>Task Name</th> <th>Duration</th> <th>Start</th> <th></th> <th>% Comp Resour</th> <th>Half 2, 2014</th> <th></th>   | ₽        | Task Name                                    | Duration | Start        |                    | % Comp Resour | Half 2, 2014       |  |
| 1         5 dbp         box 08/044         F d6/044         0 db           0.000 Amedia         5 dbp         box 08/044         1 db         box           0.000 Amedia         5 dbp         box 08/044         1 db         box           0.000 Amedia         5 dbp         box 08/044         1 db         box           0.000 Amedia         1 db         box 08/044         1 db         box           0.000 Amedia         1 db         box 08/044         1 db         box           0.000 Amedia         1 db         box 08/044         1 db         box           0.000 Amedia         1 db         box 08/044         1 db         box           0.000 Amedia         1 db         box 08/044         1 db         box           0.000 Amedia         1 db         box 100/044         1 db         box           0.000 Amedia         1 db         box 100/044         1 db         box           0.000 Amedia         1 db         box 100/044         1 db         box           0.000 Amedia         1 db         box 100/044         1 db         box           0.000 Amedia         1 db         box         box         box           0.000 Amedia         1 db   | -        | AWARD CONTRACTORS                            | 45 days  | Mon 7/28/14  | Mon 9/29/14        | %0            |                    |  |
| Nonet         5 dep         None 30(61         F 9 422.41         2         0 cc           100.0000000000         3 dep         1 we 30216         1 we 30216         1 we 30216         1 we 30216           100         1 we 30014         1 we 30216         1 we 30216         1 we 30216         1 we 30216           100         1 we 30014         1 we 30216         1 we 30216         1 we 30216         1 we 10216           100         1 we 30014         1 we 30216         1 we 30216         1 we 10216         1 we 30216           100         1 we 30014           100         1 we 30014           100         1 we 30014           100         1 we 30014           100         1 we 30014           100         1 we 30014           100         1 we 30014         1 we 3  | 2        | BSA+A/BCC Review Bids                        | 15 days  | Mon 7/28/14  | Fri 8/15/14        | %0            |                    |  |
| (100 Controlment)         (5 ap)         (100 Controlment)         (5 ap)         (100 Controlment)         (2 ap)           100 Controlment         2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           100 Controlment         2 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)         1 ap (2 ap)           <  | e        | DTCC Reviews and Approves Award              | 5 days   | Mon 8/18/14  |                    | %0            |                    |  |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   | 4        | BCC Issues Letter of Intent to Contractors   | 5 days   | Mon 8/25/14  |                    | %0            | •••••              |  |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   | 5        | Prepare and Issue PO's/Contracts             | 20 days  | Tue 9/2/14   |                    | %0            |                    |  |
| 00         10-00         10-000   | 9        | PROCUREMENT                                  | 70 days  | Tue 9/2/14   | Tue 12/9/14        | %0            |                    |  |
| 100hb         100hb <th< td=""><td>2</td><td>Submit on Long Lead Items</td><td>10 days</td><td>Tue 9/2/14</td><td></td><td>%0</td><td></td><td></td></th<>  | 2        | Submit on Long Lead Items                    | 10 days  | Tue 9/2/14   |                    | %0            |                    |  |
| 500%         Tra 3001         Tra 3014         Tra 3014 <thtra 3014<="" th="">         Tra 3014         <tht< td=""><td>œ</td><td>Review Long Lead Items</td><td>10 days</td><td>Tue 9/16/14</td><td></td><td>%0</td><td></td><td></td></tht<></thtra>  | œ        | Review Long Lead Items                       | 10 days  | Tue 9/16/14  |                    | %0            |                    |  |
| 30 days         Tes 30014         Mon 11/10/14         0 des           30 days         Tes 30014         Mon 11/20/14         0 des           30 days         Tes 30014         Mon 11/20/14         0 des           20 days         Tes 30014         Mon 10/20/14         0 des           13 days         Tes 30014         Mon 10/20/14         0 des           105 deserves         5 days         Tes 30014         Mon 30/20/14           105 deserves         5 days         Tes 30/14         Mon 30/20/14           105 deserves         5 days         Tes 30/14         Mon 30/20/14           105 deserves         5 days         Tes 30/14         Mon 30/20/14           105 deserves <td>6</td> <td>Roof Top Unit</td> <td>50 days</td> <td>Tue 9/30/14</td> <td></td> <td>%0</td> <td></td> <td></td>  | 6        | Roof Top Unit                                | 50 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 30 days         Tes 30041         Mon (17)(014         3         0%           30 days         Tes 30014         Mon (17)(01   | 10       | Exhaust Fans                                 | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 30 days         Tue 32014         Mon 11/014         5         05           30 days         Tue 32014         Mon 12/014         5         05           10 days         Tue 32014         Mon 12/014         5         05           10 days         Tue 32014         Mon 12/014         10  | 11       | CAV's & VAV's                                | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 30409         Tue 30014         Mon 1/20/14         S         Del           40505         Tue 30014         Mon 1/20/14         S         Del           40505         Tue 30014         Mon 1/20/14         Del         Del           30505         Tue 30014         Mon 1/20/14         Del         Del           30505         Tue 30014         Mon 1/20/14         Del         Del           30505         Tue 30014         Mon 1/20/14         Del         Del           20505         Tue 30014         Un 00/14  | 12       | GRD's  | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 40 days         1w 32014         Mon 172/414         S         Dis           20 days         1w 32014         Mon 172/414         S         Dis           20 days         1w 32014         Mon 172/414         Dis         Dis           20 days         1w 32014         Mon 171/014         Dis         Dis           10 days         1w 32014         Mon 171/014         Dis         Dis           11 days         1w 32014         Mon 171/014         Dis         Dis           10 days         1w 32014         Mon 171/014         Dis         Dis           10 days         1w 32014         Mon 171/014         Dis         Dis           10 days         1w 32014         Mon 120144         Dis         Dis           10 days         1w 32014         Mon 120144         Dis         Dis           10 days         1w 32014         Mon  | 13       | Sound Attenuation                            | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 40 disp         1cs 92014         Min 1/24/14         9         06           20 disp         1cs 92014         Min 1/10/14         8         06           13/ disp         1rs 92014         Min 1/10/14         8         06           00 disp         13/ disp         1rs 92014         Min 1/10/14         10           01 disp         13/ disp         1rs 92014         Min 1/10/14         12           01 disp         1rs 92014         Min 1/10/14         12         06           01 disp         1rs 92014         Min 1/10/14         12         06           01 disp         1rs 92014         Min 1/10/14         12         06           01 disp         1rs 92014         Min 1/1   | 14       | Ventilation Hood                             | 40 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days         Tue 32014         Mm 1/10101         8         0%           60 days         Tue 820014         Mm 1/10101         8         0%           70 days         Tue 820014         Mm 1/20114         8         0%           70 days         Tue 82014         Mm 1/2014         14         0%           70 days         Tue 82014         Mm 1/2014         14         0%           70 days         Tue 82014         Mm 1/2014         14         0%           70 days         Tue 82014         Mm 1/2014         14 <td>15</td> <td>Autoclave</td> <td>40 days</td> <td>Tue 9/30/14</td> <td></td> <td>%0</td> <td></td> <td></td>   | 15       | Autoclave                                    | 40 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 30 days         Tue 320/1         Mon 1/10/14         8         0%           20 days         Tue 320/14         Mon 1/10/14         8         0%           20 days         Tue 320/14         Mon 1/27/14         8         0%           20 days         Tue 320/14         Mon 1/27/14         8         0%           20 days         Tue 920/14         Mon 1/27/14         8         0%           20 days         Tue 920/14         Mon 1/27/14         8         0%           12 days         Tue 920/14         Mon 1/27/14         10         0%           12 days         Tue 920/14         Mon 1/27/14         10         0%           12 days         Tue 920/14         Mon 1/97/14         10         0%           10 days         Kould days         Tue 920/14         Mon 1/97/14         10           10 days         Kould days         Tue 920/14         Mon 1/97/14         10           10 days         Kould days  | 16       | Plumbing Fixtures                            | 30 days  | Tue 9/30/14  | Mon 11/10/14 8     | %0            |                    |  |
| 50 days         Tue 320/14         Tue 320/14         Tue 320/14         Non 1027/14         B         0%           20 days         Tue 930/14         Mon 1027/14         B         0%         0%           20 days         Tue 930/14         Mon 1027/14         B         0%         0%           30 days         Tue 930/14         Mon 1027/14         B         0%         0%           30 days         Tue 930/14         Mon 11/20/14         B         0%         0%           30 days         Tue 930/14         Mon 11/20/14         B         0%         0%           30 days         Tue 930/14         Mon 11/20/14         B         0%         0%           173 days         Tue 930/14         Mon 10/20/14         B         0%         0%           0 days         Tue 930/14         Mon 10/20/14         1/4         0%         0%           0 days         Tue 930/14         Mon 10/20/14         1/4         0%         0%           0 days         Tue 930/14         Mon 10/20/14         1/4         0%         0%           0 days         Tue 930/14         Mon 10/20/14         1/4         0%         0%           0 days         Wod 10/20/14   | 17       | Panelboard                                   | 30 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days     Tue 93014     Mon 102714     8     0%       20 days     Tue 93014     Mon 102714     8     0%       20 days     Tue 93014     Mon 102714     8     0%       10 days     Tue 93014     Mon 102714     8     0%       10 days     Tue 93014     Mon 112214     8     0%       11 days     Tue 93014     Mon 112214     8     0%       11 days     Tue 93014     Mon 112214     8     0%       11 days     Tue 93014     Mon 10214     1     0%       11 days     Tue 93014     Mon 10214     4     0%       11 days     Tue 93014     Mon 10614     40     0%       11 days     Tue 93014     Mon 10614     40     0%       11 days     Tue 93014     Mon 10614     40     0%       11 days     Tue 93014     Tue 10714     1     1     0%       11 days     Une 10214     Tue 10714     1     1     0%       11 days     Une 10214     Tue 10214     1     1     0%       11 days     Wed 10754     Tue 10214     1     1     0%       11 days     Wed 10754     Tue 102244     44     0%       11 days     Wed 107541   | 18       | Lighting                                     | 50 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days     Tue 920/14     Mon 1027/14     8     0%       22 days     Tue 920/14     Mon 1027/14     8     0%       22 days     Tue 920/14     Mon 1027/14     8     0%       147 days     Tue 920/14     Mon 1027/14     8     0%       157 days     Tue 920/14     Mon 1027/14     8     0%       160     127 days     Tue 920/14     Mon 1027/14     8     0%       161     127 days     Tue 920/14     Mon 302/14     4     0%       161     127 days     Tue 920/14     Mon 302/14     4     0%       161     5 days     Tue 920/14     Mon 302/14     14/22     0%       161     5 days     Tue 920/14     Mon 106/14     14/22     0%       161     174     11/44     14/42     0%     0%       162     0%     14/44     14/45     0%       163     10 days     Wed 1016/14     Tue 10/2/14     14/45     0%       164     10 days     Wed 1015/14     Tue 10/2/14     14/45     0%       164     10 days     Wed 1015/14     Tue 10/2/14     14/45     0%       164     10 days     Wed 1015/14     Tue 10/2/14     14/45     0%       164<   | 19       | ACT  | 20 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days         Tue 92014         Mon 1077/14         8         0/6           10 days         Tue 92014         Mon 1172/14         8         0/6           11 days         Tue 92014         Mon 106/14         4         0/6           11 days         Wed 10/15/14         Tue 10/28/14         4         0/6           11 days         Wed 10/15/14         Tue 10/28/14         4         0/6           11 days         Wed 10/15/14         Tue 10/28/14         4         0/6           Mones as Required         10 days         Wed 10/15/14         1         0/6           Mones as Required         10 days   | 20       | Resinous Flooring                            | 20 days  | Tue 9/30/14  |                    | %0            |                    |  |
| 20 days     Tue 32014     Mon 11/1014     8     06       14 days     Tue 32014     Mon 11/1014     8     06       15 days     Tue 32014     Mon 37/615     06       16 days     Tue 32014     Mon 37/615     06       17 days     Tue 32014     Mon 37/615     06       16 days     Tue 32014     Mon 10/614     40     06       16 days     Tue 92014     Mon 10/614     40     06       16 days     Tue 92014     Mon 10/614     41     06       16 days     Ure 92014     Mon 10/614     106     06       16 days     Wed 10/1514     Tue 10/2144     41     06       16 min as Required     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106     06       17 Molts     10 days     Wed 10/1514     106     06       16 min for     10 days     Wed 10/1514     106 <t< td=""><td>21</td><td>VCT</td><td>20 days</td><td>Tue 9/30/14</td><td>Mon 10/27/14 8</td><td>%0</td><td></td><td></td></t<>  | 21       | VCT  | 20 days  | Tue 9/30/14  | Mon 10/27/14 8     | %0            |                    |  |
| 40 days     Tue 92014     Mon 11/24/14     8     0%       117 days     197 days     Tue 92014     Mon 11/24/14     8     0%       1010     137 days     Tue 92014     Mon 11/24/14     8     0%       1010     137 days     Tue 92014     Mon 10/6/14     0%     0%       103 & Celings     5 days     Tue 92014     Mon 10/6/14     14.0     0%       103 & Celings     5 days     Tue 92014     Mon 10/6/14     14.2     0%       0000 Work     5 days     Wed 10/5/14     Tue 10/7/14     14.42     0%       0000 Work     5 days     Wed 10/5/14     Tue 10/2/14     44     0%       0010 Work     5 days     Wed 10/5/14     Tue 10/2/14     44     0%       0010 Work     5 days     Wed 10/5/14     Tue 10/2/14     44     0%       0010 Work     10 days     Wed 10/5/14     Tue 10/2/14     44     0%       0010 Work     10 days     Wed 10/5/14     Tue 10/2/14     44     0%       0010 Work     10 days     Wed 10/5/14     Tue 10/2/14     44     0%       0010 Work     10 days     Wed 10/5/14     Tue 10/2/14     44     0%       0010 Molt     10 days     Wed 10/5/14     Tue 10/2/14  | 22       | Wood Doors                                   | 30 days  | Tue 9/30/14  | Mon 11/10/14 8     | %0            |                    |  |
| It days         Tue 92/14         Non 316/15         0%         0%           nhue         137 days         Tue 92/14         Non 316/15         0%         0%           nhue         137 days         Tue 92/14         Non 326/14         0%         0%           nhue         2 days         Tue 92/14         Non 106/14         140         0%           ng C Gelings         5 days         Tue 92/14         Non 106/14         140         0%           sints Required         5 days         Wed 10/15/14         Tue 10/23/14         143         0%           Nons Required         5 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%           Montancial Polng         10 days         Wed 10/15/14         Tue 10/23/14         144         0%      <  | 23       | Laboratory Casework                          | 40 days  | Tue 9/30/14  |                    | %0            |                    |  |
| Ist days         Tue 92/14         Mon 316/15         004           mure         20 days         Tue 92/14         Mon 316/15         004           ing & Cellings         2 days         Tue 92/14         Mon 106/14         40         0%           ing & Cellings         5 days         Tue 93/014         Mon 106/14         40         0%           Sints         1 day         Wei 106/14         Tue 10/214         141-22         0%           Softop Work         5 days         Wei 10/714         Tue 10/214         141-22         0%           Softop Work         5 days         Wei 10/15/14         Tue 10/22/14         141-22         0%           Monis as Required         5 days         Wei 10/15/14         Tue 10/23/14         144         0%           Monis as Required         10 days         Wei 10/21/14         Tue 10/23/14         144         0%           Mechanical Piping         10 days         Wei 10/21/14         Tue 10/23/14         144         0%           Mechanical Piping         10 days         Wei 10/21/14         Tue 10/23/14         144         0%           Mechanical Piping         10 days         Wei 10/21/14         Tue 10/23/14         144         0%           Mechani  | 24       | CONSTRUCTION                                 | 137 days | Tue 9/2/14   | Mon 3/16/15        | %0            |                    |  |
| Intere         20 days         Tue 92/14         Mon 92/3/14         4         0%           ing & Cellings         5 days         Tue 92/0/14         Mon 10/6/14         40         0%           ing & Cellings         5 days         Tue 92/0/14         Mon 10/6/14         40         0%           is         1 day         Tue 10/7/14         Tue 10/7/14         14/2         0%           is         Not 10/6/14         Tue 10/7/14         14/4         0%         0%           is         Not 10/6/14         Tue 10/2/7/14         1/4         0%         0%           is         Noed 10/6/14         Tue 10/2/7/14         1/4         0%         0%           Memorial Poing         10 days         Weed 10/6/14         1/4         0%         0%           Memorial Poing         10 days         Weed 10/16/14         1/4         1/4         0%           Memorial Duct         10 days         Weed 10/16/14         1/4         0%         0%           Mechanical Duct         10 days         Weed 10/16/14         1/4         0%         0%           Mechanical Duct         10 days         Weed 10/16/14         1/4         0%         0%           Mechanical Duct <t< td=""><td>39</td><td>2nd Floor Renovations</td><td>137 days</td><td>Tue 9/2/14</td><td>Mon 3/16/15</td><td>%0</td><td></td><td></td></t<>   | 39       | 2nd Floor Renovations                        | 137 days | Tue 9/2/14   | Mon 3/16/15        | %0            |                    |  |
| ring & Cellings     5 days     Tue 9/2014     Mon 10/6/14     40     0%       ring     5 days     Tue 9/2014     Mon 10/6/14     14/2     0%       ring     1 day     Tue 10/7/14     Tue 10/7/14     1/4/2     0%       ring     1 days     Wed 10/1/14     Tue 10/2/14     1/4/2     0%       ring     ring     Wed 10/1/14     Tue 10/2/14     1/4/2     0%       ring     Wed 10/1/14     Tue 10/2/14     1/4     1/4     0%       Misins     Required     1 0 days     Wed 10/1/14     1/4     4     0%       Misins     Required     1 0 days     Wed 10/1/14     1/4     4     0%       Misins     Reduined     1 0 days     Wed 10/1/14     1/4     4     0%       Mechanical Duct     1 0 days     Wed 10/2/14     Tue 10/28/14     4     0%       Mechanical Duct     1 0 days     Wed 10/2/14     Tue 10/28/14     4     0%       Mechanical Duct     1 0 days     Wed 10/2/14     Tue 10/28/14     4     0%       Mechanical Duct     1 0 days     Wed 10/2/14     Tue 10/28/14     4     0%       Mechanical Duct     1 0 days     Wed 10/2/14     Tue 10/28/14     4     0%       Mechanic  | 40       | DTCC Move out Furniture                      | 20 days  | Tue 9/2/14   | Mon 9/29/14 4      | %0            |                    |  |
| Statistic         Tue 9/3/14         Mon 10/6/14         40         0%           R         1 day         Tue 10/7/14         Tue 10/7/14         14/2         0%           Rootop Work         5 days         Wed 10/8/14         Tue 10/7/14         14/2         0%           Ator         1 day         Tue 10/7/14         Tue 10/7/14         14/2         0%           Ator         5 days         Wed 10/8/14         Tue 10/2/14         44         0%           Mins as Required         5 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         5 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         5 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         1 0 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         1 0 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         1 0 days         Wed 10/5/14         Tue 10/2/14         44         0%           Mins as Required         1 0 days         Wed 10/5/14         Tue 10/2/14         44         0%  | 41       | Demo Existing Flooring & Ceilings            | 5 days   | Tue 9/30/14  | Mon 10/6/14 40     | %0            |                    |  |
| B         1 day         Tue 10/7/14         Tue 10/2/7/14         Tue 10/2/7/7         Tue 10/  | 42       | Demo MEP                                     | 5 days   | Tue 9/30/14  | Mon 10/6/14 40     | %0            |                    |  |
| Controp Work         5 days         Wed 10/8/14         Tue 10/28/14         Tue 10/28/14         1 et 10/28/14         4 et 10%         0%           Unbs. Roof Curtbs. Temp Protect         10 days         Wed 10/15/14         Tue 10/28/14         4 et 0%         0%           Mains as Required         5 days         Wed 10/15/14         Tue 10/28/14         1 et 0/28/14         4 et 0%         0%           Mechanical Piping         10 days         Wed 10/15/14         Tue 10/28/14         1 et 0/28/14         4 et 0%         0%           Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         1 et 0/28/14         4 et 0%         0%           Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         1 et 10/28/14         4 et 0%         0%           Mechanical Duct         10 days         Wed 10/27/14         Tue 10/28/14         1 et 10/28/14         4 et 0%         0%           Mechanical Duct         2 days         Wed 10/27/14         Tue 10/28/14         6 m         0%         0%           Mechanical Duct         2 days         Fri 10/31/14         Tuu 10/30/14         5 m         0%         0%           Nualis         5 days         Fri 10/31/14         Tuu 11/6/14         5 o         0%   | 43       | Layout Wall Partitions                       | 1 day    | Tue 10/7/14  | Tue 10/7/14 41,42  | %0            |                    |  |
| Untras, Temp Protect       10 days       Wed 10/15/14       Tue 10/28/14       Tue 10/28/14       44       0%         Mains as Required       5 days       Wed 10/15/14       Tue 10/28/14       Tue 10/28/14       44       0%         Mechanical Pping       10 days       Wed 10/15/14       Tue 10/28/14       Tue 10/28/14       44       0%         Plumbing       10 days       Wed 10/15/14       Tue 10/28/14       14       0%       Pin         Flectrical       10 days       Wed 10/15/14       Tue 11/14/14       44       0%       Pin         Mechanical Duct       10 days       Wed 10/15/14       Tue 11/14/14       46       0%       Pin         Mechanical Duct       2 days       Wed 10/29/14       Tun 11/16/14       52       0%       Pin         Mells       5 days       Fri 10/31/14       Tun 11/16/14       52       0%       Pin         Nualls       5 days       Fri 10/31/14       Tun 11/16/14       53.54       0%       Pin         Nualls       5 days       Fri 10/31/14       Tun 11/16/14       53.54       0%       Pin         Nualls       5 days       Fri 10/31/14       Tun 11/16/14       53.54       0%       Pin         Nu   | 44       | Add Misc. Steel for Rooftop Work             | 5 days   | Wed 10/8/14  | Tue 10/14/14 43    | %0            |                    |  |
| Mains as Required         5 days         Wed 10/15/14         Tue 10/28/14         44         0%           Mechanical Piping         10 days         Wed 10/15/14         Tue 10/28/14         44         0%         Pin           Mechanical Piping         10 days         Wed 10/15/14         Tue 10/28/14         44         0%         Pin           Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         44         0%         Pin           Rectancial Duct         10 days         Wed 10/28/14         Tue 11/28/14         44         0%         Pin           Mechanical Duct         10 days         Wed 10/28/14         Tue 11/28/14         66         0%         Pin           Mechanical Duct         10 days         Wed 10/28/14         Tue 11/2/14         166         0%         Pin           Mechanical Duct         2 days         Wed 10/29/14         Tuu 11/6/14         52         0%         Pin           Nalls         5 days         Fri 10/31/14         Tuu 11/6/14         52         0%         Pin         Pin           Nalls         5 days         Fri 11/7/14         Tuu 11/6/14         52.4         0%         Pin         Pin           Nalls         Fogres         Pi  | 45       | Demo Roof, Install Curbs, Roof Curbs, Temp F |          | Wed 10/15/14 | Tue 10/28/14 44    | %0            |                    |  |
| Mechanical Pping         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Flectrical         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Mechanical Duct         10 days         Wed 10/22/14         Tue 11/4/14         46         0%         1           Mechanical Duct         2 days         Wed 10/22/14         Tuu 11/6/14         52         0%         1           Nalls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           Nalls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           Nalls         5 days         Fri 10/31/14         17,01/14         53,54         0%         1           Nalls         5 days         Fri 11/17/14         10,01         1         1         1           Nalls         5 days         Fri 10/31/14         10,01         1         1         1           Nalls         5 days   | 46       | Relocated Sprinkler Mains as Required        | 5 days   | Wed 10/15/14 | Tue 10/21/14 44    | %0            |                    |  |
| Plumbing         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Electrical         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Mechanical Duct         10 days         Wed 10/15/14         Tue 10/28/14         44         0%           Mechanical Duct         10 days         Wed 10/22/14         Tue 10/28/14         14         0%           Mechanical Duct         10 days         Wed 10/22/14         Tue 10/30/14         51         0%           Nualis         5 days         Fri 10/31/14         Tun 11/6/14         52         0%         1           Nualis         5 days         Fri 10/31/14         Tun 11/6/14         52         0%         1           Nualis         5 days         Fri 10/31/14         Tun 11/6/14         52         0%         1           Nualis         5 days         Fri 10/31/14         S3.54         0%         0%         1           Isster         Task         Mechanical Tasks         Mechanical Tasks         Mechanical Tasks         Mechanical Tasks   | 49       | Rough-in Overhead Mechanical Piping          | 10 days  | Wed 10/15/14 | Tue 10/28/14 44    | %0            |                    |  |
| Electrical       10 days       Wed 10/15/14       Tue 10/28/14       44       0%       1         Mechanical Duct       10 days       Wed 10/22/14       Tue 11/4/14       46       0%       1         Mechanical Duct       2 days       Wed 10/29/14       Thu 10/30/14       51       0%       1         N Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Malls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%       1         N Malls       5 days       Fri 10/31/14       Thu 11/13/14       53,54       0%       1         Itsk       Micesse       Micesse       Micesse       Micesse       Micesse       Micesse         Itsk       Micesse  | 50       | Rough-in Overhead Plumbing                   | 10 days  | Wed 10/15/14 |                    | %0            |                    |  |
| Mechanical Duct         10 days         Wed 10/22/14         Tue 11/4/14         46         0%         1           Mechanical Duct         2 days         Wed 10/29/14         Thu 10/30/14         51         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/6/14         52         0%         1           n Walls         5 days         Fri 10/31/14         Thu 11/13/14         53.54         0%         1           n Walls         5 days         Fri 11/7/14         Thu 11/13/14         53.54         0%         1           Task         Milestone         Progress         External Milestone         1         1   | 51       | Rough-in Overhead Electrical                 | 10 days  | Wed 10/15/14 | Tue 10/28/14 44    | %0            |                    |  |
| n Walls       2 days       Wed 10/29/14       Thu 10/30/14       51       0%         n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         alls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         Ist       Progress       External Tasks       External Tasks       DeadIne         Split       Milestone       Project Summary       Project Summary       External Milestone   | 47       | Rough-in Overhead Mechanical Duct            | 10 days  | Wed 10/22/14 | Tue 11/4/14 46     | %0            |                    |  |
| n Walls 5 days Fri 10/31/14 Thu 11/6/14 52 0% 1<br>N Walls 5 days Fri 10/31/14 Thu 11/6/14 52 0% 1<br>alls 5 days Fri 11/7/14 Thu 11/13/14 52 0% 2<br>alls 7<br>Task 7<br>Progress 7<br>Milestone 1<br>Progress 7<br>Project Summary 7<br>Pade 1<br>Pade 1  | 52       | Frame Interior Walls                         | 2 days   | Wed 10/29/14 | Thu 10/30/14 51    | %0            |                    |  |
| n Walls       5 days       Fri 10/31/14       Thu 11/6/14       52       0%         alls       5 days       Fri 11/7/14       Thu 11/13/14       52,54       0%       Image: Comparison of the standard state of the   | 53       | Rough-in Plumbing in Walls                   | 5 days   | Fri 10/31/14 | Thu 11/6/14 52     | %0            |                    |  |
| alls 5 days Fri 11/7/14 Thu 11/13/14 S3,54 0% Task Task Fri 11/7/14 Thu 11/13/14 S3,54 0% Task Friend | 54       | Rough-in Electrical in Walls                 | 5 days   | Fri 10/31/14 | Thu 11/6/14 52     | %0            |                    |  |
| Task     Progress     External Tasks     Deadline       Split     Milestone     Project Summary     External Milestone     Project Summary  | 55       | Install Backing in Walls                     | 5 days   | Fri 11/7/14  | Thu 11/13/14 53,54 | %0            |                    |  |
| Split Milestone Project Summary   | Project: |  | Progress |              | Summary            |               | Deadline           |  |
|   | Date: 0  | Split  |          | •            | Project Summary    |               | External Milestone |  |
|   |          |  |          |              | Pade 1             |               |                    |  |

| ID Task Name                         | le  |                   | Duration              | Start                 | Finish Pred                |             | % Comp Resource                      | Half 2, 2014 |          |
|--------------------------------------|---|-------------------|-----------------------|-----------------------|----------------------------|-------------|--------------------------------------|--------------|----------|
|                                      | Hand \/4\/'s and C4\/'s   |                   | 3 dave                | Tile 11/11/14         | /13/14                     |             |                                      |              | Qtr 1    |
|                                      |   | 0                 | o udys                | 1 I I I I I I I I I I |                            |             |                                      |              |          |
|                                      | Insulate Walls  |                   | 2 days                | Fri 11/14/14          | Mon 11/17/14 55            |             |                                      |              |          |
| 57                                   | Wall Close-in Inspection  | tion              | 3 days                | Tue 11/18/14          |                            |             | .0                                   |              |          |
| 58                                   | Hang GWB Walls  |                   | 3 days                | Fri 11/21/14          | Tue 11/25/14 57            | %0          |                                      |              |          |
| . 20                                 | Tape & Finish Walls   |                   | 5 days                | Wed 11/26/14          | Wed 12/3/14 58             | %0          |                                      |              |          |
| 60                                   | Patch & Repair Existing Walls   | ing Walls         | 5 days                | Wed 11/26/14          | Wed 12/3/14 58             | %0          | .0                                   |              |          |
| 61                                   | Prime & Paint Walls   |                   | 3 days                | Thu 12/4/14           | Mon 12/8/14 60             | %0          |                                      |              |          |
| 63                                   | Install Acoustical Ceiling Grid                                       | ling Grid         | 5 days                | Tue 12/9/14           | Mon 12/15/14 10,61         | ,61 0%      |                                      |              |          |
| 62                                   | Set RTU   |                   | 1 day                 | Wed 12/10/14          | Wed 12/10/14 9             | %0          |                                      | <b>)</b>     |          |
| 64                                   | Install Sprinkler Drops in ACT  | s in ACT          | 5 days                | Tue 12/16/14          | Mon 12/22/14 63            | %0          |                                      |              |          |
| 65                                   | Install Mechanical in ACT   | ACT               | 10 days               | Tue 12/16/14          | Tue 12/30/14 63            | %0          |                                      |              |          |
| 66                                   | Install Electrical in ACT   | х                 | 10 days               | Tue 12/16/14          | Tue 12/30/14 63            | %0          |                                      |              |          |
| 67                                   | Above Ceiling Inspection & Completion                                 | tion & Completion | 3 days                | Wed 12/31/14          | Mon 1/5/15 64,             | 64,65,66 0% |                                      |              |          |
| 68                                   | Drop Ceiling Tiles  |                   | 2 days                | Tue 1/6/15            | Wed 1/7/15 67              | %0          |                                      |              |          |
| 69                                   | Install Resinous Flooring   | ring              | 10 days               | Thu 1/8/15            | Wed 1/21/15 68             | %0          |                                      |              |          |
| 70                                   | Install MEP Trim  |                   | 5 days                | Thu 1/22/15           | Wed 1/28/15 69             | %0          |                                      |              |          |
| 71                                   | Install Doors & Hardware  | vare              | 5 days                | Thu 1/22/15           | Wed 1/28/15 69             | %0          |                                      |              |          |
| 72                                   | Install Lab Casework  |                   | 10 days               | Thu 1/22/15           | Wed 2/4/15 69              | %0          |                                      |              |          |
| 74                                   | Install Specialties   |                   | 5 days                | Thu 1/29/15           | Wed 2/4/15 70              | %0          |                                      |              |          |
| 75                                   | Install Owner Furnished Equipment                                     | led Equipment     | 10 days               | Thu 1/29/15           | Wed 2/11/15 70             | %0          | 10                                   |              |          |
| 73                                   | Install Plumbing Fixtures   | ILES              | 5 days                | Thu 2/5/15            | Wed 2/11/15 72             | %0          |                                      |              |          |
| 76                                   | Install Base  |                   | 2 days                | Thu 2/12/15           | Fri 2/13/15 75             | %0          |                                      |              |          |
|                                      | Test, Adjust, & Balance   | Ce                | 8 days                | Mon 2/16/15           | Wed 2/25/15 76             | %0          | 20                                   |              |          |
| 78                                   | Final Inspections   |                   | 3 days                | Thu 2/26/15           | Mon 3/2/15 77              | %0          |                                      |              |          |
| 10                                   | Punchlist   |                   | 10 days               | Tue 3/3/15            | Mon 3/16/15 78             | %0          | 10                                   |              |          |
| 25 1st F                             | Floor Renovations   |                   | 53 days               | Fri 10/31/14          | Fri 1/16/15                | %0          |                                      |              | ľ        |
| 26                                   | Coredrill SOD for Plumbing Rough-in                                   | mbing Rough-in    | 1 day                 | Fri 10/31/14          | Fri 10/31/14 52            | %0          |                                      |              |          |
| 27                                   | DTCC Move Out Furniture   | niture            | 5 days                | Mon 11/17/14          | Fri 11/21/14               | %0          |                                      |              |          |
| 28                                   | Build Temporary Partitions  | itions            | 2 days                | Mon 11/17/14          | Tue 11/18/14 27SS          | SS 0%       | 1.0                                  |              |          |
| 29                                   | Demo 1st Floor ACT & Lights   | & Lights          | 3 days                | Wed 11/19/14          | Fri 11/21/14 28            | %0          | 10                                   |              |          |
| 30                                   | Sawcut & Patchback SOG for Plumbing                                   | SOG for Plumbing  | 4 days                | Mon 11/24/14          | Fri 11/28/14 29            | %0          |                                      |              |          |
| 31                                   | Overhead Plumbing Rough-in  | Rough-in          | 15 days               | Mon 12/1/14           | Fri 12/19/14 30            | %0          | .0                                   |              |          |
| 32                                   | Install ACT   |                   | 3 days                | Mon 12/22/14          | Wed 12/24/14 31            | %0          |                                      |              |          |
| 33                                   | Install Lighting  |                   | 4 days                | Fri 12/26/14          | Wed 12/31/14 32            | %0          | 10                                   |              |          |
| 34                                   | Install VCT   |                   | 3 days                | Fri 1/2/15            | Tue 1/6/15 33              | %0          |                                      |              |          |
| 35                                   | Drop Ceiling Tiles  |                   | 1 day                 | Wed 1/7/15            | Wed 1/7/15 34              | %0          |                                      |              | <b>)</b> |
| 36                                   | Painting Touch-up   |                   | 2 days                | Thu 1/8/15            | Fri 1/9/15 35              | %0          |                                      |              | <b>)</b> |
| 37                                   | Final Inspections   |                   | 3 days                | Mon 1/12/15           | Wed 1/14/15 36             | %0          |                                      |              | •        |
| 38                                   | Cleanup   |                   | 2 days                | Thu 1/15/15           | Fri 1/16/15 37             | %0          |                                      |              | <b></b>  |
|                                      |   |                   |                       |                       |                            |             |                                      |              | ſ        |
| iject: E Wing La<br>ase: Constructic | Project: E Wing Lab Renovation<br>Phase: Construction Master Schedule | Task              | Progress<br>Milestone |                       | Summary<br>Proiact Summary |             | External Tasks<br>External Milestone | Deadline     | 7        |
| 1-07-10-21                           |   |                   |                       |                       |                            |             |                                      |              |          |

### SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. 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. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
- 2. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

### 1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by 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 belongs to Owner.
  - 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.
- 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.

- 4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at weekly intervals.
- H. Material Location Reports: Submit at weekly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Special Reports: Submit at time of unusual event.
- K. 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 Division 01 Section "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.
  - 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, including commissioning activities.
  - 10. Review and finalize list of construction activities to be included in schedule.
  - 11. Review procedures for updating schedule.

## 1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

- B. 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 commencement of the Work 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 20 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. HVAC / Mechanical Equipment.
    - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
    - 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.
    - 7. 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.
- 1. Building flush-out.
- m. Startup and placement into final use and operation.
- 8. 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.
- C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- D. 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 Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
- E. 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.
- F. 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.
- G. 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 commencement of the Work.
- 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 (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

#### 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.
- 20. Material stored prior to previous report and remaining in storage.
- 21. Material stored prior to previous report and since removed from storage and installed.
- 22. Material stored following previous report and remaining in storage.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## 2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day(s) 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. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
  - 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
  - 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- B. 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.

- C. 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 013200

### SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Preconstruction photographs.
  - 2. Periodic construction photographs.
  - 3. Final completion construction photographs.
  - 4. Preconstruction video recordings.
  - 5. Periodic construction video recordings.
  - 6. Web-based construction photographic documentation.
- B. Related Requirements:
  - 1. Division 01 Section "Submittal Procedures" for submitting photographic documentation.
  - 2. Division 01 Section "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.
  - 3. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
  - 4. Division 02 Section "Structure Demolition" for photographic documentation before building demolition operations commence.
  - 5. Division 02 Section "Selective Structure Demolition" for photographic documentation before selective demolition operations commence.
  - 6. Division 31 Section "Site Clearing" for photographic documentation before site clearing operations commence.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For photographer and Web-based photographic documentation service provider.
- B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- C. Digital Photographs: Submit image files within three days of taking photographs.

- 1. Digital Camera: Minimum sensor resolution of **8** megapixels.
- 2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
- 3. Identification: Provide the following information with each image description in file metadata tag:
  - a. Name of Project.
  - b. Name and contact information for photographer.
  - c. Name of Architect.
  - d. Name of Contractor.
  - e. Date photograph was taken.
  - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
  - g. Unique sequential identifier keyed to accompanying key plan.
- D. Web-Based Photographic Documentation: Submit time-lapse sequence video recordings.
  - 1. Submit time-lapse sequence video recordings by posting to Project Web site.
  - 2. Identification: For each recording, provide the following information:
    - a. Name of Project.
    - b. Name and contact information for photographer.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Date(s) and time(s) video recording was recorded.
    - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    - g. Weather conditions at time of recording.

#### 1.4 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.
- B. Web-Based Photographic Documentation Service Provider: A firm specializing in providing photographic equipment, Web-based software, and related services for construction projects, with record of providing satisfactory services similar to those required for Project.

# 1.5 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

## PART 2 - PRODUCTS

#### 2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of **8** megapixels, and at an image resolution of not less than 3200 by 2400 pixels.
- B. Digital Video Recordings: Provide high-resolution, digital video disc.

#### 2.2 WEB-BASED PHOTOGRAPHIC DOCUMENTATION

- A. Project Camera: Provide fixed exterior camera installation, mounted to provide unobstructed view of construction site from location approved by Architect.
  - 1. Provide **two** fixed-location camera(s), with the following characteristics:
    - a. Static view.
    - b. Capable of producing minimum 3.0 megapixel pictures.
    - c. Provide power supply, active high-speed data connection to service provider's network, and static public IP address for each camera.
- B. Wireless Hand-Held Camera: Provide portable camera system capable of producing images complying with requirements in this Section, with wireless transmission to service provider's network enabling a live image stream viewable by multiple parties.
  - 1. Provide battery charger, spare battery pack, base station hub, and base station connections in a number and distribution adequate to enable wireless camera operation throughout Project site.
  - 2. Provide power supply, active high-speed data connection to service provider's network, and static public IP address at base station hub. Provide power supply, conduit, and data wiring between base station hub and base station connections.
- C. Web-Based Image Access: Password-protected access for Project team administered by Contractor, providing current image access and archival image access by date and time, with images downloadable to viewer's device.
  - 1. Provide public viewer open access to most recent project camera image.

#### PART 3 - EXECUTION

### 3.1 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

- 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 1. Date and Time: Include date and time in file name for each image.
  - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.
- D. Periodic Construction Photographs: Take 10 photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.
- F. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.
- G. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
  - 1. Three days' notice will be given, where feasible.
  - 2. In emergency situations, take additional photographs within 24 hours of request.
  - 3. Circumstances that could require additional photographs include, but are not limited to, the following:
    - a. Special events planned at Project site.
    - b. Immediate follow-up when on-site events result in construction damage or losses.
    - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
    - d. Substantial Completion of a major phase or component of the Work.
    - e. Extra record photographs at time of final acceptance.
    - f. Owner's request for special publicity photographs.

# 3.2 WEB-BASED CONSTRUCTION PHOTOGRAPHIC DOCUMENTATION

- A. Live Streaming Construction Site Images: Provide Web-accessible image of current site image from fixed location camera(s), updated at 15 minute intervals during daytime operation.
- B. Time-Lapse Sequence Construction Site Recordings: Provide video recording from a fixed-location camera to show status of construction and progress.

- 1. Frequency: Record one frame of video recording every 15 minutes, from same vantage point each time, to create a time-lapse sequence of construction activities.
- 2. Timer: Provide timer to automatically start and stop video recorder so recording occurs only during daylight construction work hours.
- C. Maintain cameras and Web-based access in good working order according to Web-based construction photographic documentation service provider's written instructions until final completion. Provide for service of cameras and related networking devices and software.

# END OF SECTION 013233

### SECTION 013300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
  - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 2. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 3. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 5. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

#### 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.

#### 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.
    - 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 Autocad, Release 2010.
    - c. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.

- d. Digital data drawing files will be made available via email(s) to the contractor.
- e. The following digital data files will by furnished for each appropriate discipline:
  - 1) Floor plans.
  - 2) Reflected ceiling plans.
  - 3) MEP 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 10 working 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 10 working 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 15 working 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 10 working 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.
- 1. 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 software-generated form from electronic project management software 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.
    - 1. 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. Post electronic submittals as PDF electronic files directly to Architect's FTP site specifically established for Project.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. 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.

- 3. Action Submittals: Submit four paper copies of each submittal unless otherwise indicated. Architect, will return two copies.
- 4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
- 5. 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.
- 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.
- 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. PDF electronic file.
- D. 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 qualitycontrol 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.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  - 2. Manufacturer and product name, and model number if applicable.
  - 3. Number and name of room or space.
  - 4. Location within room or space.
  - 5. Submit product schedule in the following format:
    - a. PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- L. LEED Submittals: Comply with requirements specified in Division 01 sustainable design requirements Section.
- M. 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.
- N. 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.

- O. 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.
- P. 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.
- Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- S. 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.
- T. 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.
- U. 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.
- V. 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.
- W. 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.
- X. 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.
- Y. 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.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## 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 Division 01 Section "Closeout Procedures."
- 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, as follows:
  - 1. Not Reviewed.
  - 2. Approved as Submitted.
  - 3. Approved as Noted.

- 4. Revise and Resubmit.
- 5. Rejected.
- 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 013300

## SECTION 013523 - SAFETY PROGRAM

- 1. <u>GENERAL</u>
  - 1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety activities and programs in connection with the Work.
  - 1.2 Contractor shall be responsible for the safety of its personnel.
  - 1.3 Hard hats and safety glasses must be worn by all personnel on the jobsite, except in contractor's administrative office/trailer. All equipment must comply with OSHA standards. All job site personnel shall wear long pants, shirts (no tank tops) and work boots.

# 2. <u>SAFETY PROGRAM</u>

- 2.1 Prior to commencing the Work, the Contractor shall submit to the (1) electronic copy and (1) bound copy of its safety program and one (1) copy of MSDS information in a 2" ringed notebook. One paper copy of the safety program and MSDS will be retained by the Construction Manager in the field office.
- 2.2 The safety program shall outline those hazards peculiar to the Contractor's Work, and the steps to be taken to eliminate or reduce the risk of injury or loss due to those hazards. **The program shall be site specific.** Contractor shall implement and enforce its safety program, which is in accordance with all OSHA, Federal, State and local laws.
- 2.3 Contractor shall designate a qualified Safety Supervisor to implement the safety program. Unless otherwise approved by the Owner, the <u>Safety Supervisor shall be the Contractor's field Superintendent/Foremen.</u>
- 2.4 Contractor shall hold weekly safety toolbox talks with all of its employees. The Contractor shall designate a responsible, capable person to conduct these meetings.

## 3. <u>SUBSTANCE ABUSE POLICY STATEMENT</u>

The Owner is committed to providing a safe work site environment for its employees and Contractors' employees. The Owner does not condone or permit employees and Contractors' employees to use or be under the influence of drugs or alcohol while they are on the work site. The Policy is as follows:

- 3.1 It is a violation Contractors' employees to use, possess, sell, trade, or otherwise engage in the use of illegal drugs and alcohol.
- 3.2 It is a violation for Contractors' employees to report to work while influenced by illegal drugs or alcohol.
- 3.3. It is a violation for Contractors' employees to use prescription drugs illegally (i.e. to use prescription drugs that have not been legally obtained) and to use prescription drugs in a

manner other than the prescribed intentions.

3.4 Contractors' employees who are taking medication, which is prescribed by their physician, are expected to discuss potential side effects with their prescribing physician, as it relates to the work requirements.

Violations of this policy will require disciplinary action. If any Contractors' employees are observed or suspected of being influenced by drugs or alcohol, they will be instructed to stop work and may be required to leave the work site.

## 4. <u>EXECUTION</u>

- 4.1 Contractor shall comply with all applicable federal, state and local laws, regulations and orders relating to occupational safety and health, and related procedures, and shall, to the extent permitted by law, indemnify and hold Owner and Architect, and their respective directors, officers, or agents and employees, harmless from any and all liability, public or private, penalties, contractual or otherwise, losses, damages, costs, attorney's fees, expenses, causes of action, claims or judgments resulting from a claim filed by anyone in connection with the aforementioned acts, or any rule, regulation or order promulgated thereunder, arising out of the Contractor's Work, this Agreement or any subcontract executed in prosecution of the Work. Contractor further agrees in the event of a claim of violation of any such laws, regulations, orders or procedures arising out of or in any way connected with the performance of this agreement, Owner may immediately take whatever action is deemed necessary by Owner and/or Architect to remedy the claim or violation. Any and all costs or expenses paid or incurred by Owner and/or Architect in taking such action shall be borne by Contractor, and may be deducted from any payments due Contractor.
- 4.2 The Contractor agrees to (1) take all necessary steps to promote safety and health on the job site; (2) cooperate with Owner and/or Architect in preventing and eliminating safety and health hazards: (3) train, instruct and provide adequate supervision to ensure that its employees are aware of, and comply with, applicable Federal and State safety and health laws, standards, regulations and rules, safe healthful work practices and all applicable safety rules, regulations and work practices and procedures (4) not create any hazards or expose any of its employees, employees of the Owner and/or Architect or employees of a hazard not within its control, notify the Owner/ Architect of the hazard as well as warn exposed persons to avoid the hazard.
- 4.3 The Contractor's Superintendent or Safety Supervisor shall immediately, verbally report, and promptly thereafter confirm in writing to the Owner and Architect any unsafe conditions or practices that are observed, or violations of job safety which are not within the Contractor's control.
- 4.4 Contractors shall immediately, verbally report, and promptly thereafter confirm in writing, to the Owner and Architect any unsafe practices or conditions that are observed which are not under the Contractor's control.

- 4.5 The Contractor's Superintendent or Safety Supervisor shall insure that adequate first aid supplies are available, and that personnel are qualified to administer first aid/CPR, as required by State and/or Federal regulations.
- 4.6 Contractor shall promptly notify Owner and Architect of any personal injury requiring medical treatment of any of the Contractor's employees at the Project site; or of significant damage to property arising in connection with Contractor's performance, as promptly as possible after the occurrence of such injury or damage. Within forty-eight hours of such occurrence, Contractor shall furnish to Owner and Architect a complete written report of such injury or damage.
- 4.7 Contractor certifies that the forgoing terms shall be made applicable to all Contractors' suppliers, materialmen or anyone furnishing labor and/or materials to the site.
- 4.8 The Contractor shall continue to educate his job Safety Supervisor or Superintendent of their responsibilities, which shall include:
  - 1. Instructing workers and subcontractors under its supervision in safe work practices and work methods at the time they are given work assignments.
  - 2. Ensuring that its workers and subcontractors have and use the proper protective equipment and suitable tools for the job.
  - 3. Continuously checking to see that no unsafe practices or conditions are allowed to exist on any part of his job.
  - 4. Acquainting its workers and subcontractors with all applicable safety requirements and seeing that they are enforced.
  - 5. Setting a good example for his workers.
  - 6. Making a complete investigation of accidents to determine facts necessary to take corrective action.
  - 7. Holding weekly "tool box" safety meetings with his men to:
    - a. Discuss observed unsafe work practices or conditions including a review of current safety report.
    - b. Review the accident experience of his crew and discuss correction of accident causes.
    - c. Encourage safety suggestions from his men.
  - 8. Seeing that prompt medical treatment is administered to an injured employee.
  - 9. Correcting or reporting immediately to job superintendent any observed unsafe conditions, practices or violations of job security.

10. Making all reports required by these Contract Documents in a full and timely fashion.

## 5. <u>SAFETY MEETINGS</u>

5.1 The Contractor's Project Manager or Superintendent shall attend weekly or biweekly supervisory job meetings. The first topic of these meetings will be job site safety. The weekly safety reports will be reviewed and violations must be corrected immediately. Contractors will be encouraged to participate in the on-going jobsite safety.

### 6. <u>TOOL BOX SAFETY MEETINGS</u>

- 6.1 The Contractor shall schedule weekly "tool box" safety sessions to be held by his job safety supervisor or superintendent for all of his employees.
- 6.2 A member of the Contractor's management staff shall periodically attend "tool box" safety sessions to evaluate their effectiveness and offer any appropriate suggestions for improvement.

### 7. <u>REPORTS</u>

- 7.1 Contractors shall report all accidents or injuries on a timely basis in accordance with all applicable regulations.
- 7.2 Contractors shall promptly complete an accident investigation report of all accidents.
- 7.3 A record of all "tool box" safety sessions shall be made.

## 8. FALL PROTECTION PROCEDURES

8.1 Contractor is responsible, in accordance with federal, state, local laws and regulations including OSHA. to provide and enforce their own site specific fall protection program and equipment. The following fall protection procedures shall be enforced by all Contractors as a minimum standard.

All workers on walking/working surfaces with unprotected sides or edges six feet (6') or higher above the next lower level must be protected from falls by the use of guardrail systems, net systems, fall arrest systems or control access zone programs. It is intended that when fall protection is required, it is required 100% of the time. All contractors are reminded that relevant industry regulations require that contractors comply with the following standards.

- 1. Workers constructing or working near leading edges must be protected.
- 2. Workers on the face of formwork or reinforcing steel must be protected at a height of 6 feet (6') or greater.

- 3. Scaffolds shall be guarded at 6 feet (6') above next lower level.
- 4. Brick layers performing overhand bricklaying and related work six feet (6') or higher above lower levels must be protected from falls.
- 5. Roofers must comply with OSHA standards for roof work.
- 6. The Contractor's controlled access zone plan shall be included in their site-specific safety program and shall be submitted prior to the start of work. Contractors are responsible for assuring programs are OSHA compliant.
- 7. Guidelines for Residential Construction or any interpretations will not be accepted in lieu of 1926 Standards.
- 8.2 Contractor shall provide its own fall protection. Fall protection may be provided by guardrail systems, net systems, or personal fall arrest systems. All fall protection systems must comply with OSHA standards.
- 8.3 Stepladders, exposed to shafts or edges of the building, greater than six feet (6') above the next lower level, must be tied off or otherwise secured. Employee must wear fall protection, i.e. harness/lanyard.
- 8.4 The Safety Cable System shall not be altered or removed without a written request submitted to the Project Manager with a copy to the Field Manager. It shall be the responsibility of each and every Contractor that is removing or altering the Safety Cable System to maintain the fall protection safety provided by the safety cable and not leave the area unprotected. Each and every Contractor shall be responsible to re-install the Safety Cable System immediately after work is completed. Each and every Contractor shall be responsible to re-install the Safety Cable System in accordance to OSHA standards.
- 8.5 Fall protection will be enforced for Structural Steel Erectors.
  - 1. As for a Contractor engaged in structural steel erection, the Contractor is specifically advised that structural steel erectors shall comply with all protection requirements for all work at a height of six feet (6') or greater above the next lower level, 100 percent of the time, by any of the following means.
    - a. Standard guardrail system.
    - b. Personal Fall Arrest System (PFAS) full body harness with shock absorbing lanyard. Maximum free fall distance permitted, with lanyard and lanyard attachment <u>shall not exceed six feet (6')</u>. Anchor point must be capable of supporting five thousand pounds. Perimeter guard cables or alignment cables may not be used for anchor points.
    - c. Access to work area shall be provided by ladders. There shall be sufficient

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Addendum 1

number of ladders available to reduce the amount of "beam walking." When it is absolutely necessary to traverse a beam, 100% fall protection must be utilized.

- d. Steel erection Contractors must, at all times, <u>be able to certify in writing that</u> <u>each of his employees has been properly trained in both OSHA fall protection</u> <u>standards and the Contractor's site specific project fall protection procedures.</u>
- e. Prior to the erection of the steel, the Contractor shall meet with the Project Manager and Safety Representatives to review and document site specific procedures.

### END OF SECTION

## **SECTION 014000 - QUALITY REQUIREMENTS**

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other qualityassurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
  - 1. Divisions 02 through 33 Sections for specific test and inspection requirements.

### 1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to

show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

- 1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

# 1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as

appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

# 1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data : For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
  - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
  - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.

# 1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
  - 1. Project quality-control manager may also serve as Project superintendent.

- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
  - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

# 1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and reinspecting.

- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, and telephone number of technical representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.
  - 3. Statement that products at Project site comply with requirements.
  - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 6. Statement whether conditions, products, and installation will affect warranty.
  - 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, and telephone number of factory-authorized service representative making report.
  - 2. Statement that equipment complies with requirements.
  - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 4. Statement whether conditions, products, and installation will affect warranty.
  - 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

#### 1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.

- 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
  - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
  - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 7. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
- M. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections in Divisions 02 through 33.

# 1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
  - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

- 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
- 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
  - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
- 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
- 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
- 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
- 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  - 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify

agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

- 1. Access to the Work.
- 2. Incidental labor and facilities necessary to facilitate tests and inspections.
- 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
- 4. Facilities for storage and field curing of test samples.
- 5. Delivery of samples to testing agencies.
- 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
- 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar qualitycontrol services required by the Contract Documents as a component of Contractor's qualitycontrol plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
  - 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

# 1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner and as follows:
  - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
  - 2. Notifying Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
  - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  - 6. Retesting and reinspecting corrected work.

# PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

# 3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
  - 1. Date test or inspection was conducted.
  - 2. Description of the Work tested or inspected.
  - 3. Date test or inspection results were transmitted to Architect.
  - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

## 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

## SECTION 014200 - REFERENCES

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

## 1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if

bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

## 1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| AA     | Aluminum Association, Inc. (The)<br>www.aluminum.org  | (703) 358-2960 |
|--------|---|----------------|
| AAADM  | American Association of Automatic Door Manufacturers www.aaadm.com                              | (216) 241-7333 |
| AABC   | Associated Air Balance Council<br>www.aabchq.com  | (202) 737-0202 |
| AAMA   | American Architectural Manufacturers Association www.aamanet.org                                | (847) 303-5664 |
| AASHTO | American Association of State Highway and Transportation<br>Officials<br>www.transportation.org | (202) 624-5800 |
| AATCC  | American Association of Textile Chemists and Colorists www.aatcc.org                            | (919) 549-8141 |
| ABAA   | Air Barrier Association of America<br>www.airbarrier.org  | (866) 956-5888 |
| ABMA   | American Bearing Manufacturers Association<br>www.abma-dc.org                                   | (202) 367-1155 |

| ACI   | American Concrete Institute<br>www.concrete.org   | (248) 848-3700                   |
|-------|---|----------------------------------|
| ACPA  | American Concrete Pipe Association<br>www.concrete-pipe.org                                 | (972) 506-7216                   |
| AEIC  | Association of Edison Illuminating Companies, Inc. (The) www.aeic.org                       | (205) 257-2530                   |
| AF&PA | American Forest & Paper Association<br>www.afandpa.org                                      | (800) 878-8878<br>(202) 463-2700 |
| AGA   | American Gas Association<br>www.aga.org   | (202) 824-7000                   |
| AGC   | Associated General Contractors of America (The)<br>www.agc.org                              | (703) 548-3118                   |
| AHA   | American Hardboard Association<br>(Now part of CPA)   |                                  |
| AHAM  | Association of Home Appliance Manufacturers www.aham.org                                    | (202) 872-5955                   |
| AI    | Asphalt Institute<br>www.asphaltinstitute.org   | (859) 288-4960                   |
| AIA   | American Institute of Architects (The)<br>www.aia.org                                       | (800) 242-3837<br>(202) 626-7300 |
| AISC  | American Institute of Steel Construction<br>www.aisc.org                                    | (800) 644-2400<br>(312) 670-2400 |
| AISI  | American Iron and Steel Institute<br>www.steel.org  | (202) 452-7100                   |
| AITC  | American Institute of Timber Construction<br>www.aitc-glulam.org                            | (303) 792-9559                   |
| ALCA  | Associated Landscape Contractors of America<br>(Now PLANET - Professional Landcare Network) |                                  |
| ALSC  | American Lumber Standard Committee, Incorporated www.alsc.org                               | (301) 972-1700                   |
| AMCA  | Air Movement and Control Association International, Inc. www.amca.org                       | (847) 394-0150                   |
| ANSI  | American National Standards Institute   | (202) 293-8020                   |

# www.ansi.org

| AOSA     | Association of Official Seed Analysts, Inc.<br>www.aosaseed.com  | (405) 780-7372                   |
|----------|--|----------------------------------|
| APA      | Architectural Precast Association<br>www.archprecast.org   | (239) 454-6989                   |
| APA      | APA - The Engineered Wood Association<br>www.apawood.org   | (253) 565-6600                   |
| APA EWS  | <ul><li>APA - The Engineered Wood Association; Engineered Wood Systems</li><li>(See APA - The Engineered Wood Association)</li></ul> |                                  |
| API      | American Petroleum Institute<br>www.api.org  | (202) 682-8000                   |
| ARI      | Air-Conditioning & Refrigeration Institute<br>www.ari.org  | (703) 524-8800                   |
| ARMA     | Asphalt Roofing Manufacturers Association www.asphaltroofing.org   | (202) 207-0917                   |
| ASCE     | American Society of Civil Engineers<br>www.asce.org  | (800) 548-2723<br>(703) 295-6300 |
| ASCE/SEI | American Society of Civil Engineers/Structural Engineering<br>Institute<br>(See ASCE)  |                                  |
| ASHRAE   | American Society of Heating, Refrigerating and Air-<br>Conditioning Engineers<br>www.ashrae.org                                      | (800) 527-4723<br>(404) 636-8400 |
| ASME     | ASME International<br>(American Society of Mechanical Engineers International)<br>www.asme.org                                       | (800) 843-2763<br>(973) 882-1170 |
| ASSE     | American Society of Sanitary Engineering<br>www.asse-plumbing.org  | (440) 835-3040                   |
| ASTM     | ASTM International<br>(American Society for Testing and Materials International)<br>www.astm.org                                     | (610) 832-9500                   |
| AWCI     | Association of the Wall and Ceiling Industry<br>www.awci.org   | (703) 534-8300                   |
| AWCMA    | American Window Covering Manufacturers Association   |                                  |

# (Now WCMA)

| AWI   | Architectural Woodwork Institute<br>www.awinet.org   | (571) 323-3636                   |
|-------|--|----------------------------------|
| AWPA  | American Wood Protection Association<br>(Formerly: American Wood Preservers' Association)<br>www.awpa.com                  | (205) 733-4077                   |
| AWS   | American Welding Society<br>www.aws.org  | (800) 443-9353<br>(305) 443-9353 |
| AWWA  | American Water Works Association<br>www.awwa.org   | (800) 926-7337<br>(303) 794-7711 |
| BHMA  | Builders Hardware Manufacturers Association www.buildershardware.com   | (212) 297-2122                   |
| BIA   | Brick Industry Association (The)<br>www.bia.org  | (703) 620-0010                   |
| BICSI | BICSI, Inc.<br>www.bicsi.org   | (800) 242-7405<br>(813) 979-1991 |
| BIFMA | BIFMA International<br>(Business and Institutional Furniture Manufacturer's Association<br>International)<br>www.bifma.com | (616) 285-3963                   |
| BISSC | Baking Industry Sanitation Standards Committee www.bissc.org   | (866) 342-4772                   |
| BWF   | Badminton World Federation<br>(Formerly: IBF - International Badminton Federation)<br>www.internationalbadminton.org       | 6-03-9283 7155                   |
| CCC   | Carpet Cushion Council<br>www.carpetcushion.org  | (610) 527-3880                   |
| CDA   | Copper Development Association<br>www.copper.org   | (800) 232-3282<br>(212) 251-7200 |
| CEA   | Canadian Electricity Association<br>www.canelect.ca  | (613) 230-9263                   |
| CEA   | Consumer Electronics Association<br>www.ce.org   | (866) 858-1555<br>(703) 907-7600 |
| CFFA  | Chemical Fabrics & Film Association, Inc.<br>www.chemicalfabricsandfilm.com  | (216) 241-7333                   |

| CGA   | Compressed Gas Association<br>www.cganet.com  | (703) 788-2700                   |
|-------|---|----------------------------------|
| CIMA  | Cellulose Insulation Manufacturers Association<br>www.cellulose.org                                 | (888) 881-2462<br>(937) 222-2462 |
| CISCA | Ceilings & Interior Systems Construction Association www.cisca.org                                  | (630) 584-1919                   |
| CISPI | Cast Iron Soil Pipe Institute<br>www.cispi.org  | (423) 892-0137                   |
| CLFMI | Chain Link Fence Manufacturers Institute<br>www.chainlinkinfo.org                                   | (301) 596-2583                   |
| CRRC  | Cool Roof Rating Council<br>www.coolroofs.org   | (866) 465-2523<br>(510) 485-7175 |
| СРА   | Composite Panel Association<br>www.pbmdf.com  | (301) 670-0604                   |
| CPPA  | Corrugated Polyethylene Pipe Association<br>www.cppa-info.org                                       | (800) 510-2772<br>(202) 462-9607 |
| CRI   | Carpet and Rug Institute (The)<br>www.carpet-rug.com  | (800) 882-8846<br>(706) 278-3176 |
| CRSI  | Concrete Reinforcing Steel Institute<br>www.crsi.org  | (847) 517-1200                   |
| CSA   | Canadian Standards Association  | (800) 463-6727<br>(416) 747-4000 |
| CSA   | CSA International<br>(Formerly: IAS - International Approval Services)<br>www.csa-international.org | (866) 797-4272<br>(416) 747-4000 |
| CSI   | Cast Stone Institute<br>www.caststone.org   | (717) 272-3744                   |
| CSI   | Construction Specifications Institute (The)<br>www.csinet.org                                       | (800) 689-2900<br>(703) 684-0300 |
| CSSB  | Cedar Shake & Shingle Bureau<br>www.cedarbureau.org   | (604) 820-7700                   |
| CTI   | Cooling Technology Institute<br>(Formerly: Cooling Tower Institute)<br>www.cti.org                  | (281) 583-4087                   |

| DHI          | Door and Hardware Institute<br>www.dhi.org  | (703) 222-2010                   |
|--------------|---|----------------------------------|
| EIA          | Electronic Industries Alliance<br>www.eia.org   | (703) 907-7500                   |
| EIMA         | EIFS Industry Members Association<br>www.eima.com   | (800) 294-3462<br>(770) 968-7945 |
| EJCDC        | Engineers Joint Contract Documents Committee<br>www.ejdc.org  | (703) 295-5000                   |
| EJMA         | Expansion Joint Manufacturers Association, Inc. www.ejma.org  | (914) 332-0040                   |
| ESD          | ESD Association<br>(Electrostatic Discharge Association)<br>www.esda.org                                | (315) 339-6937                   |
| ETL SEMCO    | Intertek ETL SEMCO<br>(Formerly: ITS - Intertek Testing Service NA)<br>www.intertek.com                 | (800) 967-5352                   |
| FIBA         | Federation Internationale de Basketball<br>(The International Basketball Federation)<br>www.fiba.com    | 41 22 545 00 00                  |
| FIVB         | Federation Internationale de Volleyball<br>(The International Volleyball Federation)<br>www.fivb.ch     | 41 21 345 35 35                  |
| FM Approvals | FM Approvals LLC<br>www.fmglobal.com  | (781) 762-4300                   |
| FM Global    | FM Global<br>(Formerly: FMG - FM Global)<br>www.fmglobal.com  | (401) 275-3000                   |
| FMRC         | Factory Mutual Research<br>(Now FM Global)  |                                  |
| FRSA         | Florida Roofing, Sheet Metal & Air Conditioning Contractors<br>Association, Inc.<br>www.floridaroof.com | (407) 671-3772                   |
| FSA          | Fluid Sealing Association<br>www.fluidsealing.com   | (610) 971-4850                   |
| FSC          | Forest Stewardship Council  | 49 228 367 66 0                  |

# www.fsc.org

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| GA    | Gypsum Association<br>www.gypsum.org                                       | (202) 289-5440  |
| GANA  | Glass Association of North America<br>www.glasswebsite.com                 | (785) 271-0208  |
| GRI   | (Part of GSI)  |                 |
| GS    | Green Seal<br>www.greenseal.org  | (202) 872-6400  |
| GSI   | Geosynthetic Institute<br>www.geosynthetic-institute.org                   | (610) 522-8440  |
| HI    | Hydraulic Institute<br>www.pumps.org                                       | (973) 267-9700  |
| HI    | Hydronics Institute<br>www.gamanet.org                                     | (908) 464-8200  |
| HMMA  | Hollow Metal Manufacturers Association<br>(Part of NAAMM)                  |                 |
| HPVA  | Hardwood Plywood & Veneer Association<br>www.hpva.org                      | (703) 435-2900  |
| HPW   | H. P. White Laboratory, Inc.<br>www.hpwhite.com                            | (410) 838-6550  |
| IAS   | International Approval Services<br>(Now CSA International)                 |                 |
| IBF   | International Badminton Federation<br>(Now BWF)                            |                 |
| ICEA  | Insulated Cable Engineers Association, Inc.<br>www.icea.net                | (770) 830-0369  |
| ICRI  | International Concrete Repair Institute, Inc.<br>www.icri.org              | (847) 827-0830  |
| IEC   | International Electrotechnical Commission<br>www.iec.ch                    | 41 22 919 02 11 |
| IEEE  | Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org | (212) 419-7900  |
| IESNA | Illuminating Engineering Society of North America                          | (212) 248-5000  |
|       |  |                 |

| www.iesna.org |  |
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| IEST  | Institute of Environmental Sciences and Technology<br>www.iest.org       | (847) 255-1561                   |
|-------|--|----------------------------------|
| IGCC  | Insulating Glass Certification Council<br>www.igcc.org                   | (315) 646-2234                   |
| IGMA  | Insulating Glass Manufacturers Alliance<br>www.igmaonline.org            | (613) 233-1510                   |
| ILI   | Indiana Limestone Institute of America, Inc.<br>www.iliai.com            | (812) 275-4426                   |
| ISO   | International Organization for Standardization www.iso.ch                | 41 22 749 01 11                  |
|       | Available from ANSI<br>www.ansi.org                                      | (202) 293-8020                   |
| ISSFA | International Solid Surface Fabricators Association www.issfa.net        | (877) 464-7732<br>(702) 567-8150 |
| ITS   | Intertek Testing Service NA<br>(Now ETL SEMCO)                           |                                  |
| ITU   | International Telecommunication Union<br>www.itu.int/home                | 41 22 730 51 11                  |
| KCMA  | Kitchen Cabinet Manufacturers Association<br>www.kcma.org                | (703) 264-1690                   |
| LMA   | Laminating Materials Association<br>(Now part of CPA)                    |                                  |
| LPI   | Lightning Protection Institute<br>www.lightning.org                      | (800) 488-6864                   |
| MBMA  | Metal Building Manufacturers Association<br>www.mbma.com                 | (216) 241-7333                   |
| MFMA  | Maple Flooring Manufacturers Association, Inc.<br>www.maplefloor.org     | (888) 480-9138                   |
| MFMA  | Metal Framing Manufacturers Association, Inc.<br>www.metalframingmfg.org | (312) 644-6610                   |
| MH    | Material Handling<br>(Now MHIA)  |                                  |

|  | Addendum | 1 |
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| MHIA  | Material Handling Industry of America<br>www.mhia.org  | (800) 345-1815<br>(704) 676-1190 |
|-------|--|----------------------------------|
| MIA   | Marble Institute of America<br>www.marble-institute.com  | (440) 250-9222                   |
| MPI   | Master Painters Institute<br>www.paintinfo.com   | (888) 674-8937<br>(604) 298-7578 |
| MSS   | Manufacturers Standardization Society of The Valve and Fittings<br>Industry Inc.<br>www.mss-hq.com | (703) 281-6613                   |
| NAAMM | National Association of Architectural Metal Manufacturers www.naamm.org                            | (630) 942-6591                   |
| NACE  | NACE International<br>(National Association of Corrosion Engineers International)<br>www.nace.org  | (800) 797-6623<br>(281) 228-6200 |
| NADCA | National Air Duct Cleaners Association<br>www.nadca.com  | (202) 737-2926                   |
| NAGWS | National Association for Girls and Women in Sport  | (800) 213-7193,<br>ext. 453      |
|       | www.aahperd.org/nagws/   |                                  |
| NAIMA | North American Insulation Manufacturers Association www.naima.org                                  | (703) 684-0084                   |
| NBGQA | National Building Granite Quarries Association, Inc.<br>www.nbgqa.com                              | (800) 557-2848                   |
| NCAA  | National Collegiate Athletic Association (The)<br>www.ncaa.org                                     | (317) 917-6222                   |
| NCMA  | National Concrete Masonry Association<br>www.ncma.org  | (703) 713-1900                   |
| NCPI  | National Clay Pipe Institute<br>www.ncpi.org   | (262) 248-9094                   |
| NCTA  | National Cable & Telecommunications Association www.ncta.com                                       | (202) 775-2300                   |
| NEBB  | National Environmental Balancing Bureau<br>www.nebb.org  | (301) 977-3698                   |
| NECA  | National Electrical Contractors Association<br>www.necanet.org                                     | (301) 657-3110                   |

| Addendum | 1 |
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| NeLMA | Northeastern Lumber Manufacturers' Association www.nelma.org   | (207) 829-6901                   |
|-------|--|----------------------------------|
| NEMA  | National Electrical Manufacturers Association<br>www.nema.org  | (703) 841-3200                   |
| NETA  | InterNational Electrical Testing Association<br>www.netaworld.org  | (888) 300-6382<br>(269) 488-6382 |
| NFHS  | National Federation of State High School Associations www.nfhs.org   | (317) 972-6900                   |
| NFPA  | NFPA<br>(National Fire Protection Association)<br>www.nfpa.org   | (800) 344-3555<br>(617) 770-3000 |
| NFRC  | National Fenestration Rating Council<br>www.nfrc.org   | (301) 589-1776                   |
| NGA   | National Glass Association<br>www.glass.org  | (866) 342-5642<br>(703) 442-4890 |
| NHLA  | National Hardwood Lumber Association<br>www.natlhardwood.org   | (800) 933-0318<br>(901) 377-1818 |
| NLGA  | National Lumber Grades Authority<br>www.nlga.org   | (604) 524-2393                   |
| NOFMA | NOFMA: The Wood Flooring Manufacturers Association<br>(Formerly: National Oak Flooring Manufacturers Association)<br>www.nofma.com | (901) 526-5016                   |
| NOMMA | National Ornamental & Miscellaneous Metals Association www.nomma.org   | (888) 516-8585                   |
| NRCA  | National Roofing Contractors Association<br>www.nrca.net   | (800) 323-9545<br>(847) 299-9070 |
| NRMCA | National Ready Mixed Concrete Association<br>www.nrmca.org   | (888) 846-7622<br>(301) 587-1400 |
| NSF   | NSF International<br>(National Sanitation Foundation International)<br>www.nsf.org   | (800) 673-6275<br>(734) 769-8010 |
| NSSGA | National Stone, Sand & Gravel Association<br>www.nssga.org   | (800) 342-1415<br>(703) 525-8788 |
| NTMA  | National Terrazzo & Mosaic Association, Inc. (The)   | (800) 323-9736                   |

|        | www.ntma.com  | (540) 751-0930                   |
|--------|---|----------------------------------|
| NTRMA  | National Tile Roofing Manufacturers Association (Now TRI)   |                                  |
| NWWDA  | National Wood Window and Door Association<br>(Now WDMA)   |                                  |
| OPL    | Omega Point Laboratories, Inc.<br>(Now ITS)   |                                  |
| PCI    | Precast/Prestressed Concrete Institute<br>www.pci.org   | (312) 786-0300                   |
| PDCA   | Painting & Decorating Contractors of America www.pdca.com   | (800) 332-7322<br>(314) 514-7322 |
| PDI    | Plumbing & Drainage Institute<br>www.pdionline.org  | (800) 589-8956<br>(978) 557-0720 |
| PGI    | PVC Geomembrane Institute<br>http://pgi-tp.ce.uiuc.edu  | (217) 333-3929                   |
| PLANET | Professional Landcare Network<br>(Formerly: ACLA - Associated Landscape Contractors of<br>America)<br>www.landcarenetwork.org | (800) 395-2522<br>(703) 736-9666 |
| PTI    | Post-Tensioning Institute<br>www.post-tensioning.org  | (602) 870-7540                   |
| RCSC   | Research Council on Structural Connections<br>www.boltcouncil.org   |                                  |
| RFCI   | Resilient Floor Covering Institute<br>www.rfci.com  | (301) 340-8580                   |
| RIS    | Redwood Inspection Service<br>www.redwoodinspection.com   | (888) 225-7339<br>(415) 382-0662 |
| SAE    | SAE International<br>www.sae.org  | (877) 606-7323<br>(724) 776-4841 |
| SDI    | Steel Deck Institute<br>www.sdi.org   | (847) 458-4647                   |
| SDI    | Steel Door Institute<br>www.steeldoor.org   | (440) 899-0010                   |
| SEFA   | Scientific Equipment and Furniture Association  | (877) 294-5424                   |

# Addendum 1

|          | www.sefalabs.com  | (516) 294-5424                   |
|----------|---|----------------------------------|
| SEI/ASCE | Structural Engineering Institute/American Society of Civil<br>Engineers<br>(See ASCE)   |                                  |
| SGCC     | Safety Glazing Certification Council<br>www.sgcc.org  | (315) 646-2234                   |
| SIA      | Security Industry Association<br>www.siaonline.org  | (866) 817-8888<br>(703) 683-2075 |
| SIGMA    | Sealed Insulating Glass Manufacturers Association (Now IGMA)  |                                  |
| SJI      | Steel Joist Institute<br>www.steeljoist.org   | (843) 626-1995                   |
| SMA      | Screen Manufacturers Association<br>www.smacentral.org  | (561) 533-0991                   |
| SMACNA   | Sheet Metal and Air Conditioning Contractors'<br>National Association<br>www.smacna.org   | (703) 803-2980                   |
| SMPTE    | Society of Motion Picture and Television Engineers www.smpte.org  | (914) 761-1100                   |
| SPFA     | Spray Polyurethane Foam Alliance<br>(Formerly: SPI/SPFD - The Society of the Plastics Industry,<br>Inc.; Spray Polyurethane Foam Division)<br>www.sprayfoam.org | (800) 523-6154                   |
| SPIB     | Southern Pine Inspection Bureau (The)<br>www.spib.org   | (850) 434-2611                   |
| SPRI     | Single Ply Roofing Industry<br>www.spri.org   | (781) 647-7026                   |
| SSINA    | Specialty Steel Industry of North America www.ssina.com   | (800) 982-0355<br>(202) 342-8630 |
| SSPC     | SSPC: The Society for Protective Coatings<br>www.sspc.org   | (877) 281-7772<br>(412) 281-2331 |
| STI      | Steel Tank Institute<br>www.steeltank.com   | (847) 438-8265                   |
| SWI      | Steel Window Institute<br>www.steelwindows.com  | (216) 241-7333                   |

| SWRI    | Sealant, Waterproofing, & Restoration Institute<br>www.swrionline.org                          | (816) 472-7974                   |
|---------|--|----------------------------------|
| TCA     | Tile Council of America, Inc.<br>(Now TCNA)  |                                  |
| TCNA    | Tile Council of North America, Inc.<br>www.tileusa.com   | (864) 646-8453                   |
| TIA/EIA | Telecommunications Industry Association/Electronic Industries<br>Alliance<br>www.tiaonline.org | (703) 907-7700                   |
| TMS     | The Masonry Society<br>www.masonrysociety.org  | (303) 939-9700                   |
| TPI     | Truss Plate Institute, Inc.<br>www.tpinst.org  | (703) 683-1010                   |
| TPI     | Turfgrass Producers International<br>www.turfgrasssod.org                                      | (800) 405-8873<br>(847) 649-5555 |
| TRI     | Tile Roofing Institute<br>www.tileroofing.org  | (312) 670-4177                   |
| UL      | Underwriters Laboratories Inc.<br>www.ul.com   | (877) 854-3577<br>(847) 272-8800 |
| UNI     | Uni-Bell PVC Pipe Association<br>www.uni-bell.org  | (972) 243-3902                   |
| USAV    | USA Volleyball<br>www.usavolleyball.org  | (888) 786-5539<br>(719) 228-6800 |
| USGBC   | U.S. Green Building Council<br>www.usgbc.org   | (800) 795-1747                   |
| USITT   | United States Institute for Theatre Technology, Inc. www.usitt.org                             | (800) 938-7488<br>(315) 463-6463 |
| WASTEC  | Waste Equipment Technology Association<br>www.wastec.org                                       | (800) 424-2869<br>(202) 244-4700 |
| WCLIB   | West Coast Lumber Inspection Bureau<br>www.wclib.org   | (800) 283-1486<br>(503) 639-0651 |
| WCMA    | Window Covering Manufacturers Association<br>www.wcmanet.org                                   | (212) 297-2122                   |

| WCSC   | Window Covering Safety Council<br>(Formerly: WCMA - Window Covering Manufacturers<br>Association)<br>www.windowcoverings.org | (800) 506-4636<br>(212) 297-2109 |  |
|--|--|----------------------------------|--|
| WDMA   | Window & Door Manufacturers Association<br>(Formerly: NWWDA - National Wood Window and Door<br>Association)<br>www.wdma.com  | (800) 223-2301<br>(847) 299-5200 |  |
| WI   | Woodwork Institute (Formerly: WIC - Woodwork Institute of<br>California)<br>www.wicnet.org                                   | (916) 372-9943                   |  |
| WIC  | Woodwork Institute of California<br>(Now WI)   |                                  |  |
| WMMPA  | Wood Moulding & Millwork Producers Association<br>www.wmmpa.com  | (800) 550-7889<br>(530) 661-9591 |  |
| WSRCA  | Western States Roofing Contractors Association<br>www.wsrca.com  | (800) 725-0333<br>(650) 570-5441 |  |
| WWPA   | Western Wood Products Association<br>www.wwpa.org  | (503) 224-3930                   |  |
| <ul> <li>C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.</li> <li>PRIVATE tbl2</li> </ul> |  |                                  |  |
| IAPMO  | International Association of Plumbing and Mechanical Officials<br>www.iapmo.org  | (909) 472-4100                   |  |
| ICC  | International Code Council<br>www.iccsafe.org  | (888) 422-7233                   |  |
| ICC-ES   | ICC Evaluation Service, Inc.<br>www.icc-es.org   | (800) 423-6587<br>(562) 699-0543 |  |
| UBC  | Uniform Building Code<br>(See ICC)   |                                  |  |
| D East   | level Government Agencies. Where appreciations and acconums are up   | ad in Spacifications             |  |

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

PRIVATE tbl3

CE Army Corps of Engineers (202) 761-0011 www.usace.army.mil

| CPSC  | Consumer Product Safety Commission<br>www.cpsc.gov              | (800) 638-2772<br>(301) 504-7923 |
|-------|---|----------------------------------|
| DOC   | Department of Commerce<br>www.commerce.gov                      | (202) 482-2000                   |
| DOD   | Department of Defense<br>http://.dodssp.daps.dla.mil            | (215) 697-6257                   |
| DOE   | Department of Energy<br>www.energy.gov                          | (202) 586-9220                   |
| EPA   | Environmental Protection Agency<br>www.epa.gov                  | (202) 272-0167                   |
| FAA   | Federal Aviation Administration<br>www.faa.gov                  | (866) 835-5322                   |
| FCC   | Federal Communications Commission<br>www.fcc.gov                | (888) 225-5322                   |
| FDA   | Food and Drug Administration<br>www.fda.gov                     | (888) 463-6332                   |
| GSA   | General Services Administration<br>www.gsa.gov                  | (800) 488-3111                   |
| HUD   | Department of Housing and Urban Development<br>www.hud.gov      | (202) 708-1112                   |
| LBL   | Lawrence Berkeley National Laboratory<br>www.lbl.gov            | (510) 486-4000                   |
| NCHRP | National Cooperative Highway Research Program<br>(See TRB)      |                                  |
| NIST  | National Institute of Standards and Technology<br>www.nist.gov  | (301) 975-6478                   |
| OSHA  | Occupational Safety & Health Administration<br>www.osha.gov     | (800) 321-6742<br>(202) 693-1999 |
| PBS   | Public Buildings Service<br>(See GSA)                           |                                  |
| PHS   | Office of Public Health and Science<br>www.osophs.dhhs.gov/ophs | (202) 690-7694                   |
| RUS   | Rural Utilities Service   | (202) 720-9540                   |

(See USDA)

| SD   | State Department<br>www.state.gov                        | (202) 647-4000 |
|------|--|----------------|
| TRB  | Transportation Research Board<br>http://gulliver.trb.org | (202) 334-2934 |
| USDA | Department of Agriculture<br>www.usda.gov                | (202) 720-2791 |
| USPS | Postal Service<br>www.usps.com                           | (202) 268-2000 |

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents. PRIVATE tbl4

| ADAAG   | Americans with Disabilities Act (ADA)   | (800) 872-<br>2253 |
|---------|---|--------------------|
|         | Architectural Barriers Act (ABA)  | (202) 272-<br>0080 |
|         | Accessibility Guidelines for Buildings and Facilities<br>Available from U.S. Access Board<br>www.access-board.gov |                    |
| CFR     | Code of Federal Regulations   | (866) 512-<br>1800 |
|         | Available from Government Printing Office   | (202) 512-<br>1800 |
|         | www.gpoaccess.gov/cfr/index.html  | 1000               |
| DOD     | Department of Defense Military Specifications and Standards   | (215) 697-<br>2664 |
|         | Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil                                | 2004               |
| DSCC    | Defense Supply Center Columbus<br>(See FS)  |                    |
| FED-STD | Federal Standard<br>(See FS)  |                    |
| FS      | Federal Specification   | (215) 697-<br>2664 |
|         | Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil                                | 2004               |
|         | Available from Defense Standardization Program  |                    |

|         | www.dps.dla.mil   |                    |
|---------|---|--------------------|
|         | Available from General Services Administration  | (202) 619-<br>8925 |
|         | www.gsa.gov   |                    |
|         | Available from National Institute of Building Sciences                                | (202) 289-<br>7800 |
|         | www.wbdg.org/ccb  |                    |
| FTMS    | Federal Test Method Standard<br>(See FS)  |                    |
| MIL     | (See MILSPEC)   |                    |
| MIL-STD | (See MILSPEC)   |                    |
| MILSPEC | Military Specification and Standards  | (215) 697-<br>2664 |
|         | Available from Department of Defense Single Stock Point<br>http://dodssp.daps.dla.mil |                    |
| UFAS    | Uniform Federal Accessibility Standards   | (800) 872-<br>2253 |
|         | Available from Access Board   | (202) 272-<br>0080 |
|         | www.access-board.gov  |                    |

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

# PRIVATE tbl5

| CBHF | State of California, Department of Consumer Affairs Bureau of Home<br>Furnishings and Thermal Insulation<br>www.dca.ca.gov/bhfti | (800) 952-<br>5210<br>(916) 574-<br>2041 |
|------|--|--|
| CCR  | California Code of Regulations   | (916) 323-<br>6815                       |
|      | www.calregs.com  |  |
| CPUC | California Public Utilities Commission   | (415) 703-<br>2782                       |
|      | www.cpuc.ca.gov  |  |
| TFS  | Texas Forest Service   | (979) 458-<br>6650                       |
|      | Forest Resource Development<br>http://txforestservice.tamu.edu   |  |

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

## SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.
  - 2. Division 31 Section "Dewatering" for disposal of ground water at Project site.
  - 3. Division 32 Section "Asphalt Paving" for construction and maintenance of asphalt pavement for temporary roads and paved areas.
  - 4. Division 32 Section "Concrete Paving" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

## 1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

- F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- G. Sewer, Water, and Electric Power Service: Use charges are specified in Division 01 Section "Multiple Contract Summary."

## 1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
  - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
  - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
  - 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.
- E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
  - 1. Locations of dust-control partitions at each phase of work.
  - 2. HVAC system isolation schematic drawing.
  - 3. Location of proposed air-filtration system discharge.
  - 4. Waste handling procedures.
  - 5. 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 and [ICC/ANSI A117.1, as amended by the State of Delaware.

## 1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

# PART 2 - PRODUCTS

# 2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide **concrete** bases for supporting posts.

# 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, 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.
  - 2. Conference room of sufficient size to accommodate meetings of **10** individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
  - 3. Drinking water and private toilet.
  - 4. Coffee machine and supplies.
  - 5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
  - 6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  - 1. Store combustible materials apart from building.

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
  - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of **8** at each return-air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures."
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with fourstage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

#### 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.
  - 1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. 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. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

#### TEMPORARY FACILITIES AND CONTROLS

- 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. 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.
- E. 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 Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- F. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    - b. Maintain negative air pressure within work area using HEPA-equipped airfiltration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
  - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dustproducing equipment. Isolate limited work within occupied areas using portable dustcontainment devices.
  - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filterequipped vacuum equipment.
- H. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
  - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

- I. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- J. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service **overhead** unless otherwise indicated.
  - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- K. 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. Install lighting for Project identification sign.
- L. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install **one** telephone line(s) for each field office.
  - 1. Provide additional telephone lines for the following:
    - a. Provide a dedicated telephone line for each facsimile machine in each field office.
  - 2. At each telephone, post a list of important telephone numbers.
    - a. Police and fire departments.
    - b. Ambulance service.
    - c. Contractor's home office.
    - d. Contractor's emergency after-hours telephone number.
    - e. Architect's office.
    - f. Engineers' offices.
    - g. Owner's office.
    - h. Principal subcontractors' field and home offices.
  - 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- M. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:
  - 1. Processor: Intel Pentium D or Intel CoreDuo, 3.0 GHz processing speed.
  - 2. Memory: 4 gigabyte.
  - 3. Disk Storage: 300 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
  - 4. Display: 22-inch (560-mm) LCD monitor with 256-Mb dedicated video RAM.
  - 5. Full-size keyboard and mouse.
  - 6. Network Connectivity: 10/100BaseT Ethernet.
  - 7. Operating System: Microsoft Windows XP Professional or Microsoft Windows Vista Business.
  - 8. Productivity Software:

- a. Microsoft Office Professional, XP or higher, including Word, Excel, and Outlook.
- b. Adobe Reader 7.0 or higher.
- c. WinZip 7.0 or higher.
- 9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
- 10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 1 Mbps download speeds at each computer.
- 11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
- 12. Backup: External hard drive, minimum 40 gigabyte, with automated backup software providing daily backups.

## 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
  - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
  - 3. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
  - 4. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
  - 5. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
  - 6. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."
- B. 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.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.

- E. 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.
- F. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Division 01 Section "Execution."
- H. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

# 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.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
  - 1. Comply with work restrictions specified in Division 01 Section "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings] requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
  - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
  - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
  - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
  - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Site Enclosure Fence: Before construction operations begins, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
  - 1. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  - 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. Protect air-handling equipment.
  - 5. Provide walk-off mats at each entrance through temporary partition.
- I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
  - 1. Prohibit smoking in construction areas.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

## 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. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - 2. Keep interior spaces reasonably clean and protected from water damage.
  - 3. Periodically collect and remove waste containing cellulose or other organic matter.
  - 4. Discard or replace water-damaged material.
  - 5. Do not install material that is wet.
  - 6. Discard, replace, or clean stored or installed material that begins to grow mold.
  - 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  - 2. Use permanent HVAC system to control humidity.
  - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    - c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

#### 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. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. 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. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
  - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

#### SECTION 016000 - PRODUCT REQUIREMENTS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Division 01 Section "Alternates" for products selected under an alternate.
  - 2. Division 01 Section "Substitution Procedures" for requests for substitutions.
  - 3. Division 01 Section "References" for applicable industry standards for products specified.

## 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 Division 01 Section "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 Division 01 Section "Submittal Procedures." Show compliance with requirements.

#### 1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
  - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
  - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, 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.
  - 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

#### 1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  - 3. See Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

## PART 2 - PRODUCTS

## 2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

- 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
- 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- 4. Where products are accompanied by the term "as selected," 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 Division 01 Section "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)

# SECTION 016200 - MATERIAL AND EQUIPMENT

## 1. GENERAL CONDITIONS

- 1.1 The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate apply to the Work specified in this Section.
- 1.2 Where work is to be executed under Separate Prime Contracts, the provisions of this Section apply to each Contract.

#### 2. <u>REQUIREMENTS INCLUDED</u>

- 2.1 All materials and equipment incorporated into the Work shall:
  - 1. Be new;
  - 2. Conform to applicable specifications and standards; and
  - 3. Comply with size, make, type and quality specified, or as specifically approved in writing by the Architect.
- 2.2 Manufactured and Fabricated Products shall conform to the following requirements:
  - 1. Designed, fabricated and assembled in accord with the best engineering and shop practices.
  - 2. Manufactured like parts of duplicate units to standard sizes and gauges, to be interchangeable.
  - 3. Two or more items of the same kind shall be identical, by the same manufacturer.
  - 4. Products shall be suitable for service conditions.
  - 5. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
- 2.3 Contractor shall not use materials or equipment for any purpose other than that for which it is designated or is specified.
- 2.4 Materials removed form existing structures shall not be reused in the completed work unless specifically indicated or specified.
- 2.5 For materials and equipment specifically indicated or specified to be reused in the Work:
  - 1. Contractor shall use special care on removal, handling storage and reinstallation, to assure proper function in the completed Work.

2. Arrange for transportation, storage and handling of products which require off-site storage, restoration or renovation. Pay all costs for such work.

## 3. MANUFACTURER'S INSTRUCTIONS

- 3.1 When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, Contractor shall obtain and distribute copies of such instructions to parties involved in the installation, including two copies to Architect.
  - 1. Maintain one set of complete instructions at the job site during installation and until completion.
- 3.2 Contractor shall handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
  - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, Contractor shall consult with Architect for further instructions.
  - 2. Contractor shall perform work in accord with manufacturer's instructions. Contractor shall not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

## 4. TRANSPORTATION AND HANDLING

- 4.1 Contractor shall arrange deliveries of Products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.
  - 1. Deliver Products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
  - 2. Contractor shall immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that Products are properly protected and undamaged.
- 4.2 Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling or damage to Products or packaging.

#### 5. <u>STORAGE AND PROTECTION</u>

- 5.1 Contractor shall store Products in accord with manufacturer's instructions, with seals and labels intact and legible.
  - 1. Contractor shall store Products subject to damage by the elements in weathertight enclosures.
  - 2. Contractor shall maintain temperature and humidity within the ranges required by manufacture's instructions.

# 5.2 Exterior Storage

- 1. Contractor shall store fabricated Products above the ground, on blocking or skids, to prevent soiling or staining. Cover Products which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- 2. Contractor shall store loose granular materials in a well-drained area on soiled surfaces to prevent mixing with foreign matter.
- 5.3 Contractor shall arrange storage in a manner to provide easy access for inspection. Contractor shall make periodic inspections of stored Products to assure that Products are maintained under specified conditions, and free from damage or deterioration.
- 5.4 Contractor shall store flammable materials so as to prevent contact with flames and fire. Conform with manufacturer's recommendations and local laws. Pay particular attention to storage of:
  - 1. Roof insulation.
  - 2. Roofing materials, including solvents.
  - 3. Paint materials.
  - 4. Cleaning and other solvents.
  - 5. Fuels.
- 5.5 Protection after Installation:
  - 1. Contractor shall provide substantial coverings as necessary to protect installed Products from damage from traffic and subsequent construction operations. Remove when no longer needed.

## 6. <u>SUBSTITUTIONS AND PRODUCT OPTIONS</u>

- 6.1 Product List.
  - 1. Within 30 days after Contract Date, Contractor shall submit to Architect a complete list of major products proposed to be used, with the name of the manufacturer and the installing Contractor.
- 6.2 Contractor's Options.
  - 1. For Products specified only by reference standard, Contractor shall select any Product meeting that standard.
  - 2. For Products specified by naming several Products or manufacturers, Contractor shall select any one of the Products or manufacturers named which complies with the

specifications.

- 3. For Products specified by naming one or more Products or manufacturers and "or equal", Bidders must, during the bidding period, submit a request for substitutions for any Product or manufacturer not specifically named. See provisions in Paragraph 1.6.3.
- 4. For Products specified by naming only one Product and manufacturer, there is no option; and Contractor shall provide the precise Product specified.
- 6.3 Substitutions.
  - 1. Until a date no later than ten (10) days before the date Bids are due, Architect will consider written requests from bidders for substitution of Products. Architect will review requests and will notify Bidders in an Addendum if the requested substitution is acceptable.
  - 2. Should the Bidder desire a substitution, it shall submit a separate request for each Product, supported with complete data, with drawings and samples as appropriate, including:
    - 1. Comparison of the qualities of the proposed substitution with that specified.
    - 2. Changes required in other elements of the Work because of the substitution.
    - 3. Effect on the construction schedule.
    - 4. Cost data comparing the proposed substitution with the Product specified.
    - 5. Any required license fees or royalties.
    - 6. Availability of maintenance service, and source of replacement materials.
  - 3. Architect, in its sole discretion, shall be the judge of the acceptability of the proposed substitution.
  - 4. A request for a substitution constitutes a representation that Bidder:
    - 1. has investigated the proposed Product and determined that it is equal to or superior in all respects to that specified;
    - 2. will provide the same warranties or bonds for the substitution as for the Product specified;
    - 3. will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects; and
    - 4. waives all claims for additional costs, under his responsibility, which may

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Addendum 1

subsequently become apparent.

6.4 Architect will review requests for substitutions with reasonable promptness, and notify Bidders, in writing, of the decision to accept or reject the requested substitution. Any decision to accept a substitution must be confirmed in an Addendum issued during the bidding period in order to be valid. Oral approvals will not be binding.

## SECTION 017300 - EXECUTION

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Coordination of Owner-installed products.
  - 5. Progress cleaning.
  - 6. Starting and adjusting.
  - 7. Protection of installed construction.
  - 8. Correction of the Work.
- B. Related Requirements:
  - 1. Division 01 Section "Summary" for limits on use of Project site.
  - 2. Division 01 Section "Submittal Procedures" for submitting surveys.
  - 3. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
  - 4. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

#### 1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

## 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

- B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- D. Certified Surveys: Submit two copies signed by professional engineer.
- E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

#### 1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
  - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in Division 01 sustainable design requirements Section.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

#### 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 Division 01 Section "Project Management and Coordination."

#### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish limits on use of Project site.
  - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 4. Inform installers of lines and levels to which they must comply.
  - 5. Check the location, level and plumb, of every major element as the Work progresses.
  - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

## 3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

## 3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.

- 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.

#### 3.6 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
  - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

## 3.7 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 Division 01 Section "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.

#### 3.8 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

#### 3.9 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.

#### SECTION 017419 – CONSTRUCTION WASTE MANAGEMENT

#### PART 1 GENERAL

#### 1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- 1.2 SECTION INCLUDES
  - A. Work of this section includes the following requirements:
    - 1. Waste management requirements.

#### 1.3 WASTE MANAGEMENT REQUIREMENTS

- A. The contractor is responsible for daily job cleaning of the project area and interior and exterior areas immediately adjacent to the project area
- B. All items (construction products, equipment, etc.) identified for demolition to be removed from the job site and properly disposed of offsite. Items identified as salvage or reuse are to be carefully removed and stored.
- C. The contractor is responsible for supplying a dumpster and payment of dump fees. Contractor is responsible for the security of dumpster. Items placed in the dumpster by others will become the responsibility of the contractor for proper disposal
- D. The dumpster is not to be used for the disposal of hazardous waste. Hazardous Wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations.

# 1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction. Comply with all applicable local ordinances and regulations.

#### 1.5 SPECIAL PROGRAMS

A. The Contractor shall be responsible for compliance with any Owner's programs involving rebates or similar incentives related to recycling, if applicable to the Project. Revenues or other savings obtained for recycling or returns shall accrue to the Contractor.

#### END OF SECTION

#### CONSTRUCTION WASTE MANAGEMENT

## SECTION 017700 - CLOSEOUT PROCEDURES

## PART 1 - GENERAL

#### 1.1 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. Division 01 Section "Photographic Documentation" for submitting final completion construction photographic documentation.
  - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 4. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
  - 5. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

# 1.2 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.

## 1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

#### 1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

#### 1.5 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 Divisions 02 through 33 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Divisions 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
  - 5. Submit test/adjust/balance records.
  - 6. Submit sustainable design submittals required in Division 01 sustainable design requirements Section and in individual Division 02 through 33 Sections.
  - 7. 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. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
- 6. Advise Owner of changeover in heat and other utilities.
- 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
- 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
- 9. Complete final cleaning requirements, including touchup painting.
- 10. 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.

## 1.6 FINAL COMPLETION PROCEDURES

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
  - 1. Submit a final Application for Payment according to Division 01 Section "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 and warranty.
  - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection to determine acceptance. 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.

## 1.7 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. Use CSI Form 14.1A.
  - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
  - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  - 3. Submit list of incomplete items in the following format:
    - a. PDF electronic file. Architect will return annotated copy.

## 1.8 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. Organize warranty documents into an orderly sequence based on the table of contents of the 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.
  - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

#### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. 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. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - 1. 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. Pest Control: Comply with pest control requirements in Division 01 Section "Temporary Facilities and Controls." Prepare written report.

#### 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.

# SECTION 017839 - PROJECT RECORD DOCUMENTS

#### PART 1 - GENERAL

#### 1.1 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.
- B. Related Requirements:
  - 1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 2. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

#### 1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record prints.
  - 2. Number of Copies: Submit copies of record Drawings as follows:
    - a. Final Submittal:
      - 1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
      - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

#### 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. Record data as soon as possible after obtaining it.
  - c. Record and check the markup before enclosing concealed installations.
- 2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
- 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
- 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
  - 1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
  - 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  - 3. Refer instances of uncertainty to Architect for resolution.
  - 4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
- C. 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. Format: Annotated PDF electronic file with comment function enabled.
  - 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  - 4. 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. Note related Change Orders and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

## 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 annotated PDF electronic file

#### 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.

## 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.

# SECTION 017900 - DEMONSTRATION AND TRAINING

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Demonstration and training video recordings.
- B. Related Requirements:
  - 1. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

## 1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
  - 1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Name and address of videographer.
    - c. Name of Architect.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Date of video recording.
  - 2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
  - 3. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

#### 1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
  - 1. Inspect and discuss locations and other facilities required for instruction.
  - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
  - 3. Review required content of instruction.
  - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

#### 1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

#### PART 2 - PRODUCTS

#### 2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project record documents.
    - e. Identification systems.
    - f. Warranties and bonds.
    - g. Maintenance service agreements and similar continuing commitments.
  - 3. Emergencies: Include the following, as applicable:

- a. Instructions on meaning of warnings, trouble indications, and error messages.
- b. Instructions on stopping.
- c. Shutdown instructions for each type of emergency.
- d. Operating instructions for conditions outside of normal operating limits.
- e. Sequences for electric or electronic systems.
- f. Special operating instructions and procedures.
- 4. Operations: Include the following, as applicable:
  - a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - 1. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.

- c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

## PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Division 01 Section "Operations and Maintenance Data."
- B. Set up instructional equipment at instruction location.

## 3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
  - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
  - 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

# SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. OPR and BoD documentation are included by reference for information only.

#### 1.2 SUMMARY

- A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.
- B. Related Sections:
  - 1. Division 23 Section "Commissioning of HVAC" for commissioning process activities for HVAC&R systems, assemblies, equipment, and components.

## 1.3 DEFINITIONS

- A. BoD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- B. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- C. CxA: Commissioning Authority.
- D. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- E. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

#### 1.4 COMMISSIONING TEAM

A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

- B. Members Appointed by Owner:
  - 1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
  - 2. Representatives of the facility user and operation and maintenance personnel.
  - 3. Architect and engineering design professionals.

#### 1.5 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the CxA and Contractor for information and use.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the BoD documentation, prepared by Architect and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

## 1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
  - 1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
  - 2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
  - 3. Attend commissioning team meetings held on a bi-weekly basis.
  - 4. Integrate and coordinate commissioning process activities with construction schedule.
  - 5. Review and accept construction checklists provided by the CxA.
  - 6. Complete electronic construction checklists as Work is completed and provide to the Commissioning Authority on a weekly basis.
  - 7. Review and accept commissioning process test procedures provided by the Commissioning Authority.
  - 8. Complete commissioning process test procedures.

## 1.7 CxA'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Provide commissioning plan.
- C. Convene commissioning team meetings.
- D. Provide Project-specific construction checklists and commissioning process test procedures.

- E. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.
- F. Prepare and maintain the Issues Log.
- G. Prepare and maintain completed construction checklist log.
- H. Witness systems, assemblies, equipment, and component startup.
- I. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

## END OF SECTION 019113

## SECTION 024113 - SELECTIVE DEMOLITION

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Demolition and removal of selected portions of building or structure.
  - 2. Salvage of existing items to be reused or recycled.
  - 3. Refer to Division 1 "Alternates" for work and requirements related to bid alternates.

#### 1.3 MATERIALS OWNERSHIP

- A. Owner will have right of first refusal to all salvaged materials. Owner will tag all items to be removed and delivered to Owner, prior to notice to proceed with demolish activities.
- B. All equipment, materials, and items removed shall remain the property of the Owner, if desired; equipment, material and items not desired to be re-used or retained by the Owner shall be removed from the site by the Contractor. The Owner's Representative will designate which equipment, materials and items will be retained
- C. Items and materials noted "to be salvaged" or "Owner's surplus" shall remain the property of the Owner. Contractor shall obtain receipt of proof of delivery to Owner designated secure storage.
- D. Documentation: Where condition of salvaged materials or adjoining construction may be subject to dispute or might be misconstrued as damage caused by selective demolition operations, document existing conditions prior to start of demolition or removal.

## 1.4 SUBMITTALS

A. Pre-demolition Photographs or Videotapes: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

#### 1.5 PROJECT CONDITIONS

A. Owner may occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Owner's Representative of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials are not expected to be present in construction to be selectively demolished.
  - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
- E. On site storage or sale of removed items or materials not intended for reuse on project is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- B. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Owner's Representative.
- D. Survey of Existing Conditions: Record existing conditions by use of photographs prior to selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
- E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

## 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building, as acceptable to governing authorities.
  - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
    - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall assuming systems have been deactivated, drained, and capped as appropriate.

## 3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

#### 3.4 **PROTECTION**:

- A. Provide temporary barricades and other forms of protection for people from operations.
- B. Provide protective measures as required to provide free and safe passage to and from occupied portions of building.
- C. Protect from damage existing finish work that is to remain in place and become exposed during demolition operations.
- D. Protect floors with suitable coverings when necessary.
- E. Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.
- F. Remove protections at completion of work.

## 3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction or as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. DO NOT CUT STRUCTURAL MEMBERS WITHOUT WRITTEN APPROVAL OF ARCHITECT
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand

tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

- 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
- 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
- 5. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
- B. Reuse of Building Elements: Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
- C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Owner's Representative, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- D. Roofing: Remove no more existing roofing than required to perform the work necessary. Provide temporary covering so that building interior remains watertight and weathertight.
  - 1. Patch and reroof as necessary after completion of new work to maintain existing watertight conditions
  - 2. Maintain existing roof warranty
- E. Patching: Patch and repair floor ceiling and wall surfaces as necessary after demolition.
  - 1. Match existing remaining adjacent surfaces
  - 2. Leave ready for new finishes as specified, leaving no visible signs of repair

## 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
  - 1. Do not allow demolished materials to 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 demolished materials.

## 3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

## END OF SECTION 024113

## SECTION 051200 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Structural steel.

## 1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

## 1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site to review existing conditions and phasing / sequencing.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Mill test reports for structural steel, including chemical and physical properties.
- C. Source quality-control reports.
- D. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- B. Comply with applicable provisions of the following specifications and documents:

- 1. AISC 303.
- 2. AISC 360.
- 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

## PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
  - 1. Select and complete connections using details indicated and AISC 360.
  - 2. Use Allowable Stress Design; data are given at service-load level.

## 2.2 STRUCTURAL-STEEL MATERIALS

- A. Channels, Angles-Shapes: ASTM A 36/A 36M.
- B. Plate and Bar: ASTM A 36/A 36M.
- C. Welding Electrodes: Comply with AWS requirements.

## 2.3 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
- B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

## 2.4 SHOP CONNECTIONS

A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

## 2.5 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

- B. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
  - 3. Ultrasonic Inspection: ASTM E 164.
  - 4. Radiographic Inspection: ASTM E 94.
- C. Prepare test and inspection reports.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

## 3.3 FIELD CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

#### 3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

- 1. Verify structural-steel materials and inspect steel frame joint details.
- 2. Verify weld materials and inspect welds.
- 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

## END OF SECTION 051200

## SECTION 081113 - 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. Standard and custom hollow metal frames.
  - 2. Steel sidelight frames.
  - 3. Factory machining for hardware.
  - 4. Light frames installed in hollow metal doors.
- B. Related Sections:
  - 1. Division 08 Sections "Flush Wood Doors" for wood doors in hollow metal frames.
  - 2. Division 08 Section "Glazing"
  - 3. Division 08 Sections "Door Hardware" for door hardware for hollow metal doors and frames.
  - 4. Section 092900 "Gypsum Wallboard Assemblies"
  - 5. Section 099100 "Painting"
  - 6. Division 26 "Electrical" Sections for electrical connections including conduit and wiring for door controls and operators installed on frames with factory installed electrical knock out boxes.
  - 7. Division 28 Section "Access Control" for access control devices installed at door openings and provided as part of a security access control system.
- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI/SDI A250.8 Recommended Specifications for Standard Steel Doors and Frames.
  - 2. ANSI/SDI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
  - 3. ANSI/SDI A250.6 Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
  - 4. ANSI/SDI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
  - 5. ANSI/SDI A250.11 Recommended Erection Instructions for Steel Frames.
  - 6. ANSI/BHMA A156.15 Hardware Preparation in Steel Doors and Frames.
  - 7. ANSI/SDI 122 Installation and Troubleshooting Guide for Standard Steel Doors and Frames.

- 8. ANSI/NFPA 80 Standard for Fire Doors and Fire Windows; National Fire Protection Association.
- 9. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
- 10. NFPA 252 Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
- 11. UL 10C Positive Pressure Fire Tests of Door Assemblies; UL 10B Fire Test of Door Assemblies; UL 1784 Standard for Air Leakage Tests of Door Assemblies.

## 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
  - 1. Elevations of each door design.
  - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  - 4. Locations of reinforcement and preparations for hardware.
  - 5. Details of anchorages, joints, field splices, and connections.
  - 6. Details of accessories.
  - 7. Details of moldings, removable stops, and glazing.
  - 8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
  - 1. Samples are only required by request of the architect and for manufactures that are not current members of the Steel Door Institute.

## 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
  - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

#### 1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

## 1.7 COORDINATION

A. Coordinate installation of anchorages 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.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CECO Door Products.
  - 2. Curries Company.
  - 3. Steelcraft.

## 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

## 2.3 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
  - 1. Fabricate frames with mitered or coped corners.
  - 2. Fabricate frames with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
  - 3. Frames for Wood Doors: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.
  - 4. Frames for Borrowed Lights: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.
  - 5. Manufacturers Basis of Design:
    - a. Curries Company -CM Series.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

## 2.4 FRAME ANCHORS

- A. Jamb Anchors:1. Stud Wall Type: Designed to engauge stud and not less than 0.042 inch thick.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

## 2.5 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Glazing: Comply with requirements in Division 08 Section "Glazing" and with the hollow metal door manufacturer's written instructions.
  - 1. Factory Glazing: Factory install glazing in doors as indicated. Doors with factory installed glass to include all of the required glazing material.

#### 2.6 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

#### 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 thickness of metal. Where

practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Frames:
  - 1. Shipping Limitations: 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.
  - 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
  - 3. Sidelight and Transom Bar 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.
  - 4. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops require wider dimensions on glass side of frame.
  - 5. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
  - 6. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
  - 7. Electrical Thru-Wiring: Provide hollow metal frames receiving electrified hardware with loose wiring harness (not attached to open throat components or installed in closed mullion tubes) and standardized Molex<sup>™</sup> plug connectors on one end to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electric through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
  - 8. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
    - a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    - b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
    - c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".
    - d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

- 9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
- 10. Jamb Anchors: Provide number and spacing of anchors as follows:
  - a. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    - 1) Three anchors per jamb up to 60 inches high.
    - 2) Four anchors per jamb from 60 to 90 inches high.
    - 3) Five anchors per jamb from 90 to 96 inches high.
    - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
    - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
- 11. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
- D. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
  - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  - 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

## 2.8 STEEL FINISHES

A. Factory Pre-Finishes: Factory apply prime coat for finish paint as specified.

## 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. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### HOLLOW METAL DOORS AND FRAMES

#### 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. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap frames to receive non-template, 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 ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
- C. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

#### 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. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touchup of compatible air drying, rust-inhibitive primer

## END OF SECTION 081113

## SECTION 081416 - FLUSH WOOD DOORS

#### 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. Section Includes:
  - 1. Solid core doors with wood veneer faces.
  - 2. Factory finishing wood doors.
  - 3. Factory machining for hardware.
  - 4. Light frames and glazing installed in wood doors.

#### B. Related Sections:

- 1. Section 081113 "Hollow Metal Frames"
- 2. Division 08 Section "Glazing" for glass view panels in wood doors.
- 3. Section 087100 "Door Hardware"
- 4. Division 28 Section "Access Control" for access control devices installed at door openings and provided as part of a security access system.
- C. Standards and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A208.1 Particleboard.
  - 2. Intertek Testing Service (ITS Warnock Hersey) Certification Listings for Fire Doors.
  - 3. NFPA 80 Standard for Fire Doors and Fire Windows; National Fire Protection Association.
  - 4. NFPA 252 Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
  - 5. UL 10C Positive Pressure Fire Tests of Door Assemblies; UL 1784 Standard for Air Leakage Tests of Door Assemblies.
  - 6. United States Green Building Council (USGBC).
  - 7. Window and Door Manufacturers Association WDMA I.S.1-A Architectural Wood Flush Doors.
  - 8. Window and Door Manufacturers Association WDMA I.S. 10 Industry Standard for Testing Cellulosic Composite Materials for Use in Fenestration Products.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, trim for openings, and WDMA I.S.1-A or AWS classifications. Include factory finishing specifications.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the wood door supplier in order to prepare the doors and frames to receive the finish hardware items.

- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
  - 1. Indicate dimensions and locations of mortises and holes for hardware.
  - 2. Indicate dimensions and locations of cutouts.
  - 3. Indicate requirements for veneer matching.
  - 4. Indicate doors to be factory finished and finish requirements.
  - 5. Indicate fire protection ratings for fire rated doors.
- D. Samples for Initial Selection: For factory finished doors.
  - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
- E. Warranty: Sample of special warranties.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, latest edition, "Industry Standard for Architectural Wood Flush Doors."

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package pre-finished doors individually in plastic bags or cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top rail with opening number used on Shop Drawings.

#### 1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which 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. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.

- b. Telegraphing of core construction in wood face veneers exceeding 0.01 inch in a 3-inch span.
- c. Telegraphing of core construction and delaminating of face in decorative laminate-faced doors.
- 2. Warranty 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 according to manufacturer's written warranty.

## PART 2 - PRODUCTS

#### 2.1 DOOR CONSTRUCTION – GENERAL

- A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty; Aesthetic Grade: Premium.
- B. Environmentally Responsible Doors: Provide where specified doors manufactured with the following environmentally responsible components:
  - 1. Particleboard Core:
    - a. Certified Wood: Interior wood flush doors (including fire rated doors) to be manufactured in accordance with FSC principles and criteria for wood building component and have FSC Chain of Custody certification.
    - b. Recycled Content: Interior wood flush doors to contain a minimum of 20% recycled content.
    - c. Low Emitting Materials: Interior wood flush doors must contain no added ureaformaldehyde resins.
  - 2. Engineered Composite Lumber Core:
    - a. Certified Wood: Interior wood flush doors (including fire rated doors) to be manufactured in accordance with FSC principles and criteria for wood building component and have FSC Chain of Custody certification.
    - b. Low Emitting Materials: Interior wood flush doors must contain no added ureaformaldehyde resins.
    - c. Stiles and Rails: No added urea formaldehyde.

## 2.2 CORE CONSTRUCTION

- A. Engineered Composite Core Wood Doors:
  - 1. Structural Composite Lumber: Engineered hardwood composite wood products tested in accordance with WDMA I.S.1A, Testing Cellulosic Composite Materials for Use in Fenestration Products containing no added Urea Formaldehyde. Comply with minimum performance levels below:
    - a. Screw Withdrawal, Face: 700 lbf (3100 N).

#### FLUSH WOOD DOORS

- b. Screw Withdrawal, Edge: 550 lbf (2440 N).
- 2. Acceptable Manufacturers:
  - a. Graham: EC, EC5
  - b. Marshfield: DCL
  - c. VT Industries: 08
- B. Particleboard Core Doors:
  - 1. Particleboard: Wood fiber based materials complying with ANSI A208.1 Particleboard standard. Grade LD-2.
  - 2. Adhesive: Fully bonded construction using Polyurethane (PUR) glue.
  - 3. Blocking: When through-bolted hardware is not used, provide wood blocking in particleboard core doors as follows:
    - a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
    - b. 5-inch (125-mm) mid-rail blocking, in doors indicated to have exit devices.
      - 1) Optional Cores for Blocking: Provide doors with either glued-wood-stave or structural-composite-lumber core instead of particleboard core for doors indicated to receive closers and exit devices.
  - 4. Acceptable Manufacturers:
    - a. Graham: PC, PC5
    - b. Marshfield: DPC
    - c. VT Industries: 02

## 2.3 VENEERED DOORS FOR TRANSPARENT FINISH

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Graham: GPD
  - 2. Marshfield: Signature
  - 3. VT Industries: Artistry
- B. Interior Solid Core Doors:
  - 1. Grade and Faces: Face grades as note below; veneer minimum 1/50-inch (0.5mm) thickness at moisture content of 12% or less.
    - a. Plain Sliced Select White Maple, A grade faces, to match existing doors in project area
  - 2. Match between Veneer Leaves:
    - a. Book match.
  - 3. Assembly of Veneer Leaves on Door Faces:

a. Running Match.

- 4. Room Match: 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 or more.
- 5. Vertical Edges: Matching same species as faces. Wood or composite material, one piece, laminated, or veneered. Minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors.
- 6. Horizontal Edges: Solid wood or structural composite material meeting the minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors
- 7. Construction: Five plies. Stiles and rails are bonded to core, then entire unit sanded before applying face veneers.
- 8. At doors over 40% of the face cut-out for lights and or louvers, furnish engineered composite lumber core.

## 2.4 LIGHT FRAMES AND GLAZING

- A. Wood Beads for Light Openings in Wood Doors up to and including 20-minute rating:
  - 1. Wood Species: Same species as door faces.
  - 2. Profile: Manufacturer's standard lipped profile. At wood core doors with 20-minute fire protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Glazing: <sup>1</sup>/<sub>4</sub>" clear, tempered.

#### 2.5 FABRICATION

- A. Factory fit doors to suit frame opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  - 1. Comply with requirements in NFPA 80 for fire rated doors.
- B. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
  - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  - 2. Metal Astragals: Factory machine astragals and formed steel edges for hardware for pairs of fire rated doors.
- C. Openings: Cut and trim openings through doors in factory.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Comply with applicable requirements in Division 08 Section "Glazing."
- D. Electrical Raceways: Provide flush wood doors receiving electrified hardware with concealed wiring harness and standardized Molex<sup>™</sup> plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through wire transfer hardware or wiring harness specified in hardware sets in Division 08 "Door Hardware". Wire nut connections are not acceptable.

#### 2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Transparent Finish: Provide a clear protective coating over the wood veneer allowing the natural color and grain of the selected wood species to provide the appearance specified. Stain is applied to the wood surface underneath the transparent finish to add color and design flexibility.
  - 1. Grade: Premium.
  - 2. Finish: Meet or exceed WDMA I.S. 1A TR6 Catalyzed Polyurethane finish performance requirements.
  - 3. Staining: As selected by Architect from manufacturer's full range, to match existing doors within project area
  - 4. Sheen: Satin.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
  - 1. Verify that 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 Division 8 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
- C. Factory Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

#### 3.3 ADJUSTING

- A. Operation: Re-hang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors 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.

#### FLUSH WOOD DOORS

# END OF SECTION 081416

## SECTION 087100 – DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
- B. Related Sections:
  - 1. Section 08 11 13 Hollow Metal Doors and Frames.
  - 2. Section 08 14 16 Flush Wood Doors.
  - 3. Section 08 74 00 Access Control Hardware.
  - 4. Section 28 13 00 Access Control.
- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC International Building Code.
  - 3. NFPA 70 National Electrical Code.
  - 4. NFPA 80 Fire Doors and Windows.
  - 5. NFPA 101 Life Safety Code.
  - 6. NFPA 105 Installation of Smoke Door Assemblies.
  - 7. State Building Codes, Local Amendments.
- D. Standards: All hardware specified herein shall comply with the following industry standards:
  - 1. ANSI/BHMA Certified Product Standards A156 Series
  - 2. UL10C Positive Pressure Fire Tests of Door Assemblies

## 1.2 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

- 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
- 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
- 3. Content: Include the following information:
  - a. Type, style, function, size, label, hand, and finish of each door hardware item.
  - b. Manufacturer of each item.
  - c. Fastenings and other pertinent information.
  - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
  - e. Explanation of abbreviations, symbols, and codes contained in schedule.
  - f. Mounting locations for door hardware.
  - g. Door and frame sizes and materials.
- 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- D. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- E. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

## 1.3 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders

hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

- C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
  - 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- D. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.
  - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
  - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:
  - 1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  - 2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
    - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
    - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
      - 1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
      - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
    - c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
  - 3. NFPA 101: Comply with the following for means of egress doors:

- a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
- b. Thresholds: Not more than 1/2 inch high.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

#### 1.5 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

### 1.6 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

- 1. Structural failures including excessive deflection, cracking, or breakage.
- 2. Faulty operation of the hardware.
- 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
  - 1. Ten years for mortise locks and latches.
  - 2. Twenty five years for manual door closers.
  - 3. Two years for electromechanical door hardware.

## 1.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

## PART 2 - PRODUCTS

#### 2.1 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
  - 1. Acceptable Manufacturers:
    - a. Hager Companies (HA).
    - b. McKinney Products (MK).

## 2.2 POWER TRANSFER DEVICES

A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex<sup>™</sup> standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

- 1. Acceptable Manufacturers:
  - a. Hager Companies (HA) ETW-QC (# wires) Option.
  - b. McKinney Products (MK) QC (# wires) Option.
- B. Provide mortar guard enclosure on steel frames installed at masonry openings for each electrical hinge specified.
- C. Electric Door Hardware Cords: Provide electric transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to throughdoor wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
  - 1. Acceptable Manufacturers:
    - a. McKinney Products (MK) QC-C Series.

Provide one each of the following tools as part of the base bid contract:

- a. McKinney Products (MK) Electrical Connecting Kit: QC-R001.
- b. McKinney Products (MK) Connector Hand Tool: QC-R003.

## 2.3 DOOR OPERATING TRIM

## 2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU).
- C. Cylinders: Original manufacturer cylinders complying with the following:
  - 1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
  - 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 3. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

- D. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
  - 1. Existing System: Master key or grand master key locks to Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
  - 1. Top Master Key: One (1)
  - 2. Change Keys per Cylinder: Two (2)
  - 3. Master Keys (per Master Key Group): Two (2)
  - 4. Grand Master Keys (per Grand Master Key Group): Two (2)
- F. Key Registration List: Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

## 2.5 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) ML2000 Series.
- B. Lock Trim Design: As specified in Hardware Sets.

## 2.6 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
- B. Standards: Comply with the following:
  - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  - 2. Strikes for Bored Locks and Latches: BHMA A156.2.

### 2.7 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

#### DOOR HARDWARE

- 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
- 2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
- 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
- 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  - a. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.
- 5. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units and high impact, non-corrosive plastic covers standard.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) DC8000 Series.
    - b. LCN Closers (LC) 4040XP Series.
    - c. Sargent Manufacturing (SA) 351 Series.
    - d. Norton Door Controls (NO) 7500 Series.

## 2.8 ARCHITECTURAL TRIM

- A. Door Protective Trim
  - 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
  - 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

- 3. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.
- 4. Acceptable Manufacturers:
  - a. Burns Manufacturing (BU).
  - b. Rockwood Manufacturing (RO).
  - c. Trimco (TC).

## 2.9 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  - 1. Acceptable Manufacturers:
    - a. Burns Manufacturing (BU).
    - b. Rockwood Manufacturing (RO).
    - c. Trimco (TC).

#### 2.10 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- C. Acceptable Manufacturers:
  - 1. Pemko Manufacturing (PE).
  - 2. Reese Enterprises, Inc. (RS).
  - 3. Zero International (ZE).

### 2.11 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

#### 3.2 PREPARATION

- A. Hollow Metal Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

## 3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

## 3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

### 3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

#### 3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

## 3.7 DOOR HARDWARE SCHEDULE

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
  - 1. Door E203A

weight)

|                   | 3 | Hinge (heavy weight)     | T4A3786 5" x 4-1/2"  | US26D   | MK |
|-------------------|---|--------------------------|----------------------|---------|----|
|                   | 1 | Mortise Lock (storeroom) | ML2057 NSA           | 626     | RU |
|                   | 1 | Door Closer              | PR7500 w/hold open   | 689     | NO |
|                   | 1 | Kick Plate               | K1050 8" 4BE         | US32D   | RO |
|                   | 1 | Door Stop                | OH100 overhead stop  | US26D   | RO |
|                   | 1 | Gasketing                | S773BL               |         | PE |
| Door E203B, E204C |   |                          |                      |         |    |
|                   | 2 | Hinge (heavy weight)     | T4A3786 5" x 4-1/2"  | US26D   | MK |
|                   | 1 | Electric Hinge (heavy    | T4A3786-QC12 5" x 4- | - US26D | MK |

1/2"

2.

| 1 | Card Reader Lock (fail-<br>secure) | ML20605 x TCRNE1<br>NSA SS078 M812 24AD | 626   | RU |
|---|------------------------------------|---|-------|----|
| 1 | Door Closer                        | R7500                                   | 689   | NO |
| 1 | Kick Plate                         | K1050 8" 4BE                            | US32D | RO |
| 1 | Door Stop                          | OH100 overhead stop                     | US26D | RO |
| 1 | Gasketing                          | S773BL                                  |       | PE |
| 1 | Frame Harness                      | QC-C1500                                |       | MK |
| 1 | Door Harness                       | QC-CXXX                                 |       | MK |

## 4. Door E204A, E204B

| 3 | Hinge (heavy weight)  | T4A3786 5" x 4-1/2"      | US26D | MK |
|---|-----------------------|--------------------------|-------|----|
| 1 | Mortise Lock (office) | ML2051 NSA               | 626   | RU |
| 1 | Door Closer           | PR7500 w/Hold Open       | 689   | NO |
| 1 | Kick Plate            | K1050 8" 4BE             | US32D | RO |
| 1 | Door Stop             | OH100 overhead stop      | US26D | RO |
| 1 | Gasketing             | S773BL                   |       | PE |
| 1 | Door bottom (E204A)   | 4131SNSL surface mounted |       | PE |
|   |                       |                          |       |    |

# 5. Door E204D Existing door, replace lock, hinge as noted

| 1 | Electric Hinge (heavy   | T4A3786-QC12 5" x 4- | US26D | MK |
|---|-------------------------|----------------------|-------|----|
|   | weight)                 | 1/2"                 |       |    |
| 1 | Card Reader Lock (fail- | ML20605 x TCRNE1     | 626   | RU |
|   | secure)                 | NSA SS078 M812       |       |    |
|   |                         | 24AD                 |       |    |
| 1 | Frame Harness           | QC-C1500             |       | MK |
| 1 | Door Harness            | QC-CXXX              |       | MK |

## END OF SECTION 087100

### SECTION 092900 - 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 1 Specification Sections, apply to this Section.

#### B. SUMMARY

- A. This Section includes the following:
  - 1. Interior gypsum wallboard.
  - 2. Non-load-bearing steel framing.
- B. Related Sections include the following:
  - 1. Section 095113 "Acoustic Panel Ceilings"
  - 2. Section 096513 "Resilient Base"
  - 3. Section 099110 "Painting"
  - 4. Section 123553 "Wood Laboratory Casework"

#### D. SUBMITTALS

A. Product Data: For each type of product indicated.

### 1.2 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain each of the following from a single manufacturer, unless otherwise indicated:
  - 1. Steel framing members for gypsum board assemblies.
  - 2. Gypsum board and other panel products.
  - 3. Finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

## 1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.
- C. Steel framing and related accessories shall be stored and handled in accordance with the A.I.S.I. "Code of Standard Practice."

### 1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Room Temperatures: For non-adhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.
- C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

### 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. Steel Framing and Furring:
    - a. MarinoWare; Division of Ware Ind.
    - b. Scafco
    - c. Clark Dietrich
    - d. U.S. Steel
  - 2. Gypsum Board and Related Products:
    - a. Georgia Pacific Gypsum Corp.
    - b. Lafarge Gypsum
    - c. National Gypsum Company.
    - d. United States Gypsum Co.

# 2.2 STEEL FRAMING FOR WALLS AND PARTITIONS

- A. General: Provide steel framing members complying with the following requirements:
- B. Protective Coating: Meeting requirements of ASTM C645-08; roll-formed from hot-dipped galvanized steel; complying with ASTM A1003 and ASTM A653 G40 or equivalent corrosion resistant coating.

- C. Steel Studs and Runners: ASTM C 645-08, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:
  - 1. Thickness: 0.0179 inch (25 gage) or members that can show certified third party testing in accordance with ICC ES AC86 that meets ASTM C645-08 Section 9.2. unless otherwise indicated.
  - 2. Thickness: .0296 inch or members that can show certified third party testing in accordance with ICC ES AC86 that meets ASTM C645-08 Section 9.2. as follows:
    - a. For head runner, sill runner, jamb, and cripple studs at door and other openings.
    - b. Where indicated.
  - 3. Depth: Refer to Partition schedule for sizes (depth) required.
- D. Deflection Track: Manufacturer's top runner complying with the requirements of ASTM C 645-08 and with 2-inch- deep flanges.
- E. DEFLECTION TRACK (SLOTTED): Manufacturer's single, 2 <sup>1</sup>/<sub>2</sub> inch deep-leg, U-shaped steel track: punched with vertical slots in both legs.

1. Subject to compliance with requirements, suggested product: Dietrich Metal Framing SLP-TRK® Slotted Deflection Track by Brady Innovations

- F. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet Meeting requirements of ASTM C645-08; roll formed from hot-dipped galvanized steel; complying with ASTM A1003 and ASTM A653 G40 or equivalent corrosion resistant coating to form 1/2-inch- deep channel of the following configuration:
- H. Single- or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- wide face connected to flanges by double-slotted or expanded-metal legs (webs).
  - Subject to compliance with requirements, provide Dietrich Metal Framing Single Leg Resilient Channel [RCSD] [RCUR] or Double Leg Resilient – [RCDN] [RCDE] UltraSTEEL<sup>™</sup> (25 gauge equivalent) (20 gauge equivalent).
- I. Steel Channel Bridging steel, 0.0538-inch minimum thickness of base (uncoated) metal and 1/2-inch- wide flanges, 1-1/2 inches deep, 475 lb/1000 feet unless otherwise indicated.
  - 1. Subject to compliance with requirements, provide one of the following:
  - 2. Dietrich Metal Framing: Spazzer® 9200 Bridging and Bracing Bar
  - 3. U-Channel Assembly: [3/4 inches] [1-1/2 inches] [2 inches] a.Dietrich Metal Framing; EasyClip<sup>™</sup> U-Series<sup>™</sup> Clip Angle or equivalent.
- J. Fasteners for Metal Framing: ASTM C 1513 Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

K. Flat Strap and Backing Plate: Sheet for blocking and bracing in length and width indicated:1. Galvanized Sheet Steel.

## 2.3 GYPSUM BOARD PRODUCTS

- A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application. Provide gypsum board in widths of 48 inches.
  - 1. Provide tapered edges, thickness as shown on drawings.

## 2.4 TRIM ACCESSORIES

- A. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:
  - 1. Material: Formed metal or plastic, with metal complying with the following requirement: Steel sheet zinc coated by hot-dip process or rolled zinc.
  - 2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047.
  - 3. Cornerbead on outside corners, unless otherwise indicated.
- B. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.
- C. Cornerbead on outside corners, unless otherwise indicated.
- D. Edge trim complying with shape LC-bead.

## 2.5 JOINT TREATMENT MATERIALS

- A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
- B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.
- C. Drying-Type Joint Compounds for Gypsum Board: Factory-mixed vinyl-based all-purpose compound formulated for both taping and topping compounds

## 2.9 MISCELLANEOUS MATERIALS

- A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.
  - 1. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.
  - 2. Steel drill screws complying with ASTM C 1002 for the following applications:

#### **GYPSUM BOARD ASSEMBLIES**

- 3. Fastening gypsum board to steel members less than 0.033 inch (0.84 mm) thick And fastening gypsum board to gypsum board:
  - a. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
- B. b. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing).
  - 1. Mineral-Fiber Type: Fibers manufactured from slag wool or rock wool.
  - 2. Thickness: 3" unless noted otherwise

### 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. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLING STEEL FRAMING, GENERAL

- A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.
- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."
- C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
  - 1. Isolate partition framing and wall furring where it abuts structure, except at floor. Install sliptype joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
- D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

## 3.3 INSTALLING STEEL PARTITION AND SOFFIT FRAMING

A. Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction.

- B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
- D. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.
- E. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. 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.
  - 1. Install two studs of not less than 18 gage at each jamb, unless otherwise indicated.
  - 2. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.
- F. 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.

#### 3.4 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch 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. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- F. Attach gypsum panels to framing provided at openings and cutouts.
- G. Form control and expansion joints with space between edges of adjoining gypsum panels.
- H. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.

- 2. Fit gypsum panels around ducts, pipes, and conduits.
- 3. Where partitions intersect open structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit structural members; allow 1/4- to 3/8-inch wide joints to install sealant.
- I. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch wide spaces at these locations, and trim edges with LC-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- J. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
  - 1. Space screws a maximum of 12 inches o.c. for vertical applications.

## 3.5 PANEL APPLICATION METHODS

- A. Single-Layer Application:
  - 1. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
  - 2. Locate edge joints over framing member
  - 3. Stagger abutting end joints not less than one framing member in alternate courses of board.
  - 4. On furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- B. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

## 3.6 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. Install cornerbead at external corners.
- B. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.
- C. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.

# 3.7 FINISHING GYPSUM BOARD ASSEMBLIES

- 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 those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
  - 1. Level 1: Embed tape at joints in ceiling plenum areas, fully concealed areas, and where indicated.
  - 2. Level 4: Typical unless noted otherwise: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at **all panel surfaces that will be exposed to view, unless otherwise indicated**. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration. Use ready-mixed, drying-type, all-purpose or topping compound as applicable to the finish levels specified for the following:
    - a. Embedding and First Coat
    - b. Fill (Second) Coat
    - c. Finish (Third) Coat
  - 3. Level 5: Where noted provide Level 5 gypsum board finish to existing wall, Fill and sand all imperfections in existing wall; and apply a thin, uniform skim coat of joint compound over entire surface as skim coat, use joint compound specified for third coat, or a product specially formulated for this purpose and acceptable to gypsum board manufacturer. Touch up and sand to produce a surface free of visual defects, tool marks, and ridges and ready for finish noted.

## END OF SECTION 092900

## SECTION 095113 - ACOUSTICAL PANEL 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. This Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Related Sections include the following:
  - 1. Division 09 Section "Acoustical Tile Ceilings" for ceilings consisting of mineral-base acoustical tiles used with concealed suspension systems, stapling, or adhesive bonding.
- C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

#### 1.3 DEFINITIONS

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  - 1. Ceiling suspension system members.
  - 2. Method of attaching hangers to building structure.
    - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

- 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- 4. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).
- C. Samples for Initial Selection: For components with factory-applied color finishes.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
  - 1. Acoustical Panel: Set of 6-inch- (150-mm-) square Samples of each type, color, pattern, and texture.
  - 2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- (300-mm-) long Samples of each type, finish, and color.
- E. Qualification Data: For testing agency.
- F. Field quality-control test reports.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- H. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type.
- I. Maintenance Data: For finishes to include in maintenance manuals.

## 1.5 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAPaccredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- B. Source Limitations:
  - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
  - 2. Suspension System: Obtain each type through one source from a single manufacturer.
- C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
  - 1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

- a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
- b. Identify materials with appropriate markings of applicable testing and inspecting agency.
- 2. Surface-Burning Characteristics: Provide acoustical panels with the following surfaceburning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
  - a. Smoke-Developed Index: 450 or less.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages 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 panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, 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 panel ceiling installation.

## 1.8 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

## 1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
  - 2. Suspension System Components: Quantity of each exposed component equal to 1.0 percent of quantity installed.
  - 3. Hold-Down Clips: Equal to 2.0 percent of quantity installed.

### PART 2 - PRODUCTS

## 2.1 ACOUSTICAL PANELS, GENERAL

- A. Recycled Content: Provide acoustical panels with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 1.0% by weight.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
  - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.
- C. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
  - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.
- D. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard 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 D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
- E. Antimicrobial Fungicide Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

#### 2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING – ACP. 1

- A. Basis-of-Design Product: Subject to compliance with requirements, provide USG Sheetrock Lay In Ceiling Panel "Clima Plus" Vinyl #3270 or a comparable product by one of the following:
  - 1. BPB USA.
  - 2. Chicago Metallic Corporation.
  - 3. Ecophon CertainTeed, Inc.
  - 4. Tectum Inc.
  - 5. Armstrong World Industries.
- B. Classification: Provide fire-resistance-rated panels complying with ASTM E 1264 for type, form, and pattern as follows:
  - 1. Type and Form: Type XX.
  - 2. Pattern: G.
- C. Color: White.
- D. LR: Not less than 0.77.
- E. NRC: N.A.
- F. CAC: Not less than 40.
- G. Edge/Joint Detail: Square.
- H. Thickness: 1/2 inch
- I. Modular Size: 24 by 48 inches (610 by 1220 mm).
- J. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

### 2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING – ACP. 2

- A. Basis-of-Design Product: Subject to compliance with requirements, provide USG Interiors Inc., Radar Illusion Two Climaplus, High NRC #22121 or a comparable product by one of the following:
  - 1. BPB USA.
  - 2. Chicago Metallic Corporation.
  - 3. Ecophon CertainTeed, Inc.
  - 4. Tectum Inc.
  - 5. Armstrong World Industries
- B. Classification: Provide fire-resistance-rated panels complying with ASTM E 1264 for type, form, and pattern as follows:

- 1. Type and Form: Type III, mineral base with membrane-faced overlay; Form 2, water felted; with factory applied acrylic latex paint.
- 2. Pattern: CE (perforated, small holes & lightly textured).
- C. Color: White.
- D. LR: Not less than 0.84.
- E. NRC: Not less than 0.70.
- F. CAC: Not less than 35.
- G. Edge/Joint Detail: Beveled Tegular
- H. Thickness: 3/4 inch (19 mm).
- I. Modular Size: 24 by 48 inches (610 by 1220 mm).
- J. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.
- 2.4 METAL SUSPENSION SYSTEMS, GENERAL
  - A. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
  - B. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
  - C. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
    - 1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
  - D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
    - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
      - a. Type: Postinstalled expansion anchors.

- b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
- c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
- d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
- 2. 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 hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- E. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  - 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
  - 3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
  - 4. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch- (3.5-mm-) diameter wire.
- F. Hanger Rods: steel, zinc coated or protected with rust-inhibitive paint.
- G. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch-(1-mm-) thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch-(8-mm-) diameter bolts.
- H. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches (610 mm) o.c. on all cross tees.
- I. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

# 2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide USG Interiors Donn DX 15/16 "Exposed" Tee System or a comparable product by one of the following:
  - 1. BPB USA.
  - 2. Chicago Metallic Corporation.
  - 3. Ecophon CertainTeed, Inc.
  - 4. Armstrong World Industries.
- B. Wide-Face, Capped, Double-Web, Fire-Rated Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-

# ACOUSTICAL PANEL CEILINGS

dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges.

- 1. Structural Classification: Intermediate-duty system.
- 2. End Condition of Cross Runners: Override (stepped) or Butt-edge type.
- 3. Face Design: Flat, flush.
- 4. Cap Material: Steel cold-rolled sheet.
- 5. Cap Finish: Painted white.

## 2.6 METAL EDGE MOLDINGS AND TRIM

- A. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Armstrong World Industries, Inc.;
  - 2. BPB USA; <
  - 3. Chicago Metallic Corporation;
  - 4. Fry Reglet Corporation;
  - 5. USG Interiors, Inc.;
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
  - 1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
  - 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
  - 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
- C. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:
  - 1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 (ASTM B 221M) for Alloy and Temper 6063-T5.
  - 2. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
  - 3. Conversion-Coated Finish: AA-M12C42 (Chemical Finish: cleaned with inhibited chemicals; acid-chromate-fluoride-phosphate conversion coating).
  - 4. Conversion-Coated and Factory-Primed Finish: AA-M12C42R1x (Chemical Finish: cleaned with inhibited chemicals; acid-chromate-fluoride-phosphate conversion coating; organic coating as follows):

- a. Manufacturer's standard, factory-applied prime-coat finish ready for field painting.
- 5. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
- 6. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; organic coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
  - a. Organic Coating: Thermosetting, primer/topcoat system with a minimum dry film thickness of 0.8 to 1.2 mils (0.02 to 0.03 mm).

### 2.7 ACOUSTICAL SEALANT

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Acoustical Sealant for Exposed and Concealed Joints:
    - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
    - b. USG Corporation; SHEETROCK Acoustical Sealant.
    - c. Approved equal.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
  - 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 to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 3. 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.
  - 4. 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.
  - 5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures 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.
  - 6. 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 structure to which hangers are attached and 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.
  - 7. 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.
  - 8. 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.
  - 9. Do not attach hangers to steel deck tabs.
  - 10. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  - 11. 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.
  - 12. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
  - 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, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
  - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
  - 1. Arrange directionally patterned acoustical panels as follows:
    - a. As indicated on reflected ceiling plans.
  - 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
  - 3. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
  - 4. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
  - 5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
  - 6. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.
  - 7. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
  - 8. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

# 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections and prepare reports:
  - 1. Suspended ceiling system.
  - 2. Hangers, anchors and fasteners.

- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- C. Tests and Inspections: Testing and inspecting of completed installations of acoustical panel ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
  - 1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
    - a. Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
    - b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Remove and replace acoustical panel ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

## 3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

### SECTION 096513 - 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 rubber bases.
  - 2. Resilient molding accessories.
- B. Related Sections:
  - 1. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. 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.
- D. Product Schedule: For resilient products: Use same designations indicated on Drawings.
- E. Samples for Initial Selection: For each type of product indicated.
- F. 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.
- G. Product Schedule: For resilient products. Use same designations indicated on Drawings.

#### 1.4 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.
- B. Mockups: Provide resilient products with mockups specified in other Sections.

### 1.5 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).

#### 1.6 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.

#### 1.7 EXTRA MATERIALS

- 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.

# PART 2 - PRODUCTS

#### 2.1 RESILIENT BASE (B-1)

- A. Resilient Base:
  - 1. Basis of Design Manufacturers: Subject to compliance with requirements, provide Johnsonite Millwork Wallbase Reveal or a comparable product by one of the following:
    - a. Endura Rubber Flooring; Division of Burke Industries, Inc.
    - b. Estrie Products International; American Biltrite (Canada) Ltd.
    - c. Flexco, Inc.
    - d. Mondo Rubber International, Inc.

- e. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
- f. Roppe Corporation, USA.
- B. Resilient Base Standard: ASTM F 1861.
  - 1. Material Requirement: Type TP (rubber, thermoplastic).
  - 2. Manufacturing Method: Group I (solid, homogeneous).
  - 3. Style: Millwork Reveal.
- C. Minimum Thickness:  $\frac{1}{4}$ ".
- D. Height: 4 ¼ inches high. As indicated on Drawings.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed Mitered.
- G. Inside Corners: Job formed Mitered.
- H. Colors and Patterns: 80 Fawn
- 2.2 RESILIENT WALL BASE (B-2):
  - A. Wall Base: ASTM F 1861.
    - 1. Johnsonite; Traditional Wall Base.
    - 2. Approved Equal.
  - B. Type (Material Requirement): TP (rubber, thermoplastic).
  - C. Group (Manufacturing Method): I (solid, homogeneous).
  - D. Style: Cove (with top-set toe) unless noted otherwise.
  - E. Minimum Thickness: 0.125 inch.
  - F. Height: 4 inches typical.
  - G. Lengths: Coils in manufacturer's standard length.
  - H. Outside Corners: Premolded.
  - I. Inside Corners: Premolded.
  - J. Surface: Smooth.
  - K. Color: 80 Fawn.

#### 2.3 RESILIENT MOLDING ACCESSORY

- A. Resilient Molding Accessory:
  - 1. Manufacturers: Subject to compliance with requirements, provide Johnsonite or a comparable product by one of the following:
    - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
    - b. Flexco, Inc.
    - c. Roppe Corporation, USA.
- B. Description: Transition and joiner strips as described herein and as indicated on drawings, including but not limited to:
  - 1. Johnsonite #RRS-80-C (1/8" to floor) or approved equal
  - 2. Johnsonite #CTA-80-H (1/4" to 1/8")
  - 3. Johnsonite #CTA-80-K (3/8" to 1/8")
  - 4. Floor Reducer strips.
- C. Material: Rubber.
- D. Profile and Dimensions: As indicated.
- E. Colors and Patterns: 80 Fawn.

#### 2.4 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.
  - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. Cove Base Adhesives: Not more than 50 g/L.
    - b. Rubber Floor Adhesives: Not more than 60 g/L.
- C. Floor Movement Joint: Schluter Model DILEX-KS, low profile stainless steel, model EKSB. Size for depth of flooring material; locate as indicated and where resilient flooring is installed across floor construction joints subject to movement.
- D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.
- E. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

## 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. Concrete Substrates for Resilient Stair Treads and Accessories: 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.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
  - 4. Moisture Testing: Perform tests recommended by manufacturer[ and as follows]. Proceed with installation only after substrates pass testing.
    - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.
- 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 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.
- E. 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. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
  - 1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
  - 2. 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. Install reducer strips at edges of carpet resilient floor covering that would otherwise be exposed.

## 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 096513

## SECTION 096519 - 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. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 1. Show details of special patterns.
- C. Samples for Initial Selection: For each type of floor tile indicated.
- D. Samples for Verification: Full-size units of each color and pattern of floor tile required.
- E. Product Schedule: For floor tile. Use same designations indicated on Drawings.
- F. Qualification Data: For qualified Installer.
- G. Maintenance Data: For each type of floor tile to include in maintenance manuals.

### 1.4 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 and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

- B. 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.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockups for floor tile including resilient base and accessories.
    - a. Size: Minimum 100 sq. ft. (9.3 sq. m) for each type, color, and pattern in locations directed by Architect.

### 1.5 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.

### 1.6 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.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

## 1.7 EXTRA MATERIALS

- 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 for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

## PART 2 - PRODUCTS

#### 2.1 VINYL COMPOSITION FLOOR TILE (VCT-1, VCT-2, and VCT-3).

- A. Basis-of-Design: Product subject to compliance with requirements, provide Mannington Commercial Progressions or a comparable product by one of the following:
  - 1. Azrock.
  - 2. Armstrong World Industries .
  - 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. Size: 12 by 12 inches (305 by 305 mm).
- F. Colors and Patterns: As follows:
  - 1. VCT-1: Cool White 55141
  - 2. VCT-2: Duchess Blue 55170
  - 3. VCT 3: Putty 55129
  - 4. VCT 4: Bed Rock 55519

## 2.2 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 floor tile and substrate conditions indicated.
  - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
- C. Seamless-Installation Accessories:
  - 1. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.
    - a. Use chemical-bonding compound that has a VOC content of 350 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

- 1. Use sealant that has a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2. Joint-Sealant Color: Match floor tile.

## 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.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
  - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
    - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- D. 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.
- E. 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.
- F. 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 square with room axis and 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 with grain running in one direction.
- 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. Joint Sealant: Apply sealant to resilient floor tile perimeter and around columns, at door frames, and at other joints and penetrations.
- E. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient floor tile surfaces before applying liquid cleaners, sealers, and finish products.
  - 1. Sealer: Apply two base coats of liquid sealer.
  - 2. Finish: Apply three coats of liquid floor finish.
- F. Cover floor tile until Substantial Completion.

## END OF SECTION 096519

### SECTION 096723 - RESINOUS FLOORING

### 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 resinous flooring systems
- B. Related Sections include the following:
  - 1. Division 7 Section "Joint Sealants" for sealants installed at joints in resinous flooring systems.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Samples for Initial Selection: For each type of exposed finish required.
- C. Samples for Verification: For each resinous flooring system required, 6 inches (150 mm) square, applied to a rigid backing by Installer for this Project.
- D. Product Schedule: Use resinous flooring designations indicated in Part 2 and room designations indicated on Drawings in product schedule.
- E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- F. Material Test Reports: For each resinous flooring component.
- G. Material Certificates: For each resinous flooring component, signed by manufacturer.
- H. Maintenance Data: For resinous flooring to include in maintenance manuals.

### 1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer (applicator), with a record of successful in-service performance in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project.

- 1. Engage an installer who employs only persons trained and approved by resinous flooring manufacturer for applying resinous flooring systems indicated.
- 2. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, patching and fill material, joint sealant, repair materials, grouting coats, and topcoats, through one source from a single manufacturer.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Lighting: Provide permanent lighting.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

# PART 2 - PRODUCTS

#### 2.1 RESINOUS FLOORING – RS-1

- A. Manufacturers: Basis-of-Design Product: "DymaFlake with DX-470 Polyaspartic finish coat. Subject to meeting the specifications, products by other manufacturers, including, but not limited to the following may be considered
  - 1. Crossfield Products Corp., Dex-O-Tex.
  - 2. Stonehard.
  - 3. Seamless Technologies.
- B. Resinous Flooring: Abrasion-, impact- and chemical-resistant, decorative-aggregate-filled, epoxy-resin-based, monolithic floor surfacing designed to produce a seamless floor and integral cove base.

- C. Materials: VOC Content of Resinous Flooring: Provide resinous flooring systems, for use inside the weatherproofing system, that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24): Resinous Flooring: 100 g/L.
- D. System Characteristics:
  - 1. Color and Pattern: As selected by architect from manufacturer's full standard range
  - 2. Wearing Surface: Textured for slip resistance.
  - 3. Integral Cove Base: see drawings
  - 4. Overall System Thickness: 1/8"
- E. System Components: Manufacturer's standard components that are compatible with each other and as follows:
  - 1. Body Coat(s):
    - a. Resin: Epoxy.
    - b. Formulation Description: 100 percent solids.
    - c. Application Method: Self-leveling slurry with broadcast aggregates.
    - d. Aggregates: Colored quartz (ceramic-coated silica).
  - 2. Topcoat: Chemical-resistant sealing or finish coat . DX-470 HS
    - a. Resin: Chemical resistant polyaspartic.
    - b. Formulation Description: high solids.
    - c. Type: Clear.
    - d. Finish: Gloss.
    - e. Number of Coats: One.
- F. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
  - 1. Compressive Strength: 10,000 per ASTM C 579.
  - 2. Tensile Strength: 4,200 per ASTM D-638.
  - 3. Flexural Strength ASTM C 580 : 4,300.
  - 4. Impact Resistance MIL-D-3134F4.7.3: Withstands 15ft/lbs without cracking, delamination, or chipping.
  - 5. Abrasion Resistance ASTM C-501: 32 mg.
  - 6. Flammability ASTM D 635: Self-extinguishing per.
  - 7. Hardness ASTM D 2240 : 70-75, Shore D.
  - 8. Adhesive Strength MIL-D-26413: 420 psi.

## 2.2 ACCESSORY MATERIALS

- A. Primer: Type recommended by manufacturer to substrate and body indicated
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

- C. Metal Cap for integral Cove Base: Square metal cap approved by flooring manufacturer
- D. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.
  - 1. Use sealants that 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 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
  - 1. Roughen concrete substrates as follows:
    - a. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
  - 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
  - 3. Verify that concrete substrates are dry.
    - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 5 lbs. of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) of slab in 24 hours.
    - b. Perform plastic sheet test, ASTM D 4263. Proceed with application only after testing indicates absence of moisture in substrates.
    - c. Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.
  - 4. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

### 3.2 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
  - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
  - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
  - 3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
    - a. Apply joint sealant to comply with manufacturer's written recommendations.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply reinforcing membrane to substrate cracks.
- D. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.
- E. Apply self-leveling slurry body coat in thickness indicated for flooring system.
  - 1. Broadcast aggregates and, after resin is cured, remove excess aggregates to provide surface texture indicated.
- F. Apply topcoat(s) in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer.

### 3.3 FIELD QUALITY CONTROL

- A. Core Sampling: IF REQUESTED At the direction of Owner and at locations designated by Owner, take 1 core sample per 1000 sq. ft. (92.9 sq. m) of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take two additional samples. Repair damage caused by coring and correct deficiencies.
- B. Material Sampling: Owner may at any time and any number of times during resinous flooring application require material samples for testing for compliance with requirements.
  - 1. Owner will engage AT HIS COST an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
  - 3. If test results show applied materials do not comply with specified requirements, CONTRACTOR WILL BE RESPONSIBLE for costs of testing, remove noncomplying

materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

# 3.4 CLEANING AND PROTECTING

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

## END OF SECTION 096723

## SECTION 099100 - 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.
- B. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
  - 1. Concrete.
  - 2. Gypsum Board.
  - 3. Steel.
  - 4. Galvanized metal.
  - 5. Aluminum (not anodized or otherwise coated).
  - 6. Wood.
  - 7. Mechanical and electrical work (MEP)

## 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- C. Samples for Initial Selection: Upon request, for each type of topcoat product indicated.
- D. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.
  - 1. Submit 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 for location and application area.
  - 5. Label each sample as to date painted.
- E. 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.
  - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

## 1.5 QUALITY ASSURANCE

A. MPI Standards:

- 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
- 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. 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.

## 1.7 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 in snow, rain, fog, or mist; 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.

## 1.8 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. Furnish an additional 2 percent, but not less than 1 gal. of each material and color applied.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Basis of Manufacturers (Interior Gypsum Wall Finishes): Subject to compliance with requirements, provide Sherwin Williams Company or an equal vent product by one of the following:
  - 1. Benjamin Moore & Co.
  - 2. Duron, Inc.
  - 3. Finnaren & Haley Inc (F&H)
  - 4. M.A.B. Paints.
  - 5. Architect approved equal.

## 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. Non-flat 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. Floor Coatings: VOC not more than 100 g/L.
  - 5. Shellacs, Clear: VOC not more than 730 g/L.
  - 6. Shellacs, Pigmented: VOC not more than 550 g/L.
- C. Colors: Match Architect's samples or as indicated in a color schedule.
  - P-1: Sherwin Williams #SW 7043 Worldly Gray.
  - P-2: Sherwin Williams #SW 7046 Anonymous.
  - P-3: Sherwin Williams #SW 7604 Smokey Blue.
  - P-4: Sherwin Williams #SW 7007 Ceiling White.
  - P-5: Sherwin Williams #SW Not Used.
  - P-6: Sherwin Williams #SW Not Used.
  - P-7: White erase White Coating.

### 2.3 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler: MPI #4.
  - 1. VOC Content: E Range of E2.
- B. Epoxy Block Filler: MPI #116.
  - 1. VOC Content: E Range of E2.

### 2.4 PRIMERS/SEALERS

A. Alkali-Resistant Primer: MPI #3: Factory-formulated water based, alkali-resistant acrylic-latex interior primer for interior plaster applications.

- 1. VOC Content: E Range of E2.
- B. Exterior Primer under Acrylic Finishes: Factory-formulated acrylic-based primer for exterior application. Provide breathable primer at masonry locations.
  - 1. VOC Content: E Range of E2.
  - 2. Benjamin Moore; Moore's IMC Acrylic Metal Primer No. M04: Applied at a dry film thickness of not less than 2.0 mils.
  - 3. M. A. B. Paint; Rust-O-Lastic Hydro-Prime II Acrylic (DTM) Maintenance Primer 073-189: Applied at a dry film thickness of not less than 2.0 mils.
- C. Interior Latex Primer/Sealer: MPI #50.
  - 1. VOC Content: E Range of E2.
  - 2. Environmental Performance Rating: EPR 2.
- D. Interior Alkyd Primer/Sealer: MPI #45.
  - 1. VOC Content: E Range of E2.
- E. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

## 2.5 METAL PRIMERS

- A. Alkyd Anticorrosive Metal Primer: MPI #79.
  - 1. VOC Content: E Range of E2.
- B. Waterborne Galvanized-Metal Primer: MPI #134.
  - 1. VOC Content: E Range of E2.
- C. Quick-Drying Primer for Aluminum: MPI #95.
  - 1. VOC Content: E Range of E2.
- D. Rust-Inhibitive Primer (Water Based): MPI #107.
  - 1. VOC Content: E Range of E2.
  - 2. Environmental Performance Rating: EPR 2.
- E. Vinyl Wash Primer: MPI #80.

## 2.6 WOOD PRIMERS

- A. Exterior Latex Wood Primer: MPI #6.
  - 1. VOC Content: E Range of E2.

- B. Exterior Alkyd Wood Primer: MPI #5.
  - 1. VOC Content: E Range of E2.
- C. Interior Latex-Based Wood Primer: MPI #39.
  - 1. VOC Content: E Range of E2.
  - 2. Environmental Performance Rating: EPR 2.

### 2.7 EPOXY PAINT

- A. Water-Based Epoxy (Interior and Exterior): MPI #215. A water based, two component epoxy type, semi-gloss finish coating. Subject to compliance with requirements, provide one of the following:
  - 1. Benjamin Moore; M43/M44- 84 Acrylic Epoxy Semi-Gloss.
  - 2. M. A. B. Paint; Ply-Tile 530 Water-Reducible Acrylic Epoxy Semi-Gloss.
- B. Water-Based Epoxy (Interior and Exterior): MPI #115. A water based, two component epoxy type, Gloss finish coating. Subject to compliance with requirements, provide one of the following:
  - 1. Benjamin Moore & Co.; Acrylic Epoxy Gloss "A", Hardener "B", M43/M44.
  - 2. ICI Paints; Devoe Coatings, Tru Glaze WB Epoxy Gloss Coating, 4408/4418
  - 3. Porter Paints; Dura-Glaze WB, Gloss Epoxy, 9371.
  - 4. PPG Architectural Finishes, Inc.; Aquapon, Waterborne Epoxy, 98-1/98-98.
  - 5. Sherwin-Williams Company (The); Industrial & Marine, Water Based Catalyzed Epoxy, B70W Series.

#### 2.8 ALKYD PAINTS

- A. Exterior Alkyd Enamel (Flat): MPI #8 (Gloss Level 1).
  - 1. VOC Content: E Range of E1.
- B. Exterior Alkyd Enamel (Semi-gloss): MPI #94 (Gloss Level 5).
  - 1. VOC Content: E Range of E1.
- C. Exterior Alkyd Enamel (Gloss): MPI #9 (Gloss Level 6).
  - 1. VOC Content: E Range of E1.
- D. Interior Alkyd (Flat): MPI #49 (Gloss Level 1).
  - 1. VOC Content: E Range of E1.
- E. Interior Alkyd (Eggshell): MPI #51 (Gloss Level 3).
  - 1. VOC Content: E Range of E1.

- F. Interior Alkyd (Semi-gloss): MPI #47 (Gloss Level 5).
  - 1. VOC Content: E Range of E1.
- G. Interior Alkyd (Gloss): MPI #48 (Gloss Level 6).
  - 1. VOC Content: E Range of E1.

### 2.9 ACRYLIC-RESIN COATING.

- A. Breathable cement masonry paint formulated with colorfast pigments for use over cement plaster or masonry substrates. Include manufacturer's recommended primers. Coating shall be mildew resistant and breathable with perm rating of not less than 15 per ASTM E 96.
  - 1. Thoro Products, "Thorosheen" or equal.
  - 2. Primer: Thoroseal 1000.
  - 3. Texture: smooth

## 2.10 LATEX PAINTS

- A. Interior Latex (Flat): MPI #53 (Gloss Level 1).
  - 1. VOC Content: E Range of E1.
  - 2. Environmental Performance Rating: EPR 1.5.
- B. Interior Latex (Low Sheen): MPI #44 (Gloss Level 2).
  - 1. VOC Content: E Range of E1.
  - 2. Environmental Performance Rating: EPR 2.
- C. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).
  - 1. VOC Content: E Range of E1.
  - 2. Environmental Performance Rating: EPR 2.
- D. Interior Latex (Satin): MPI #43 (Gloss Level 4).
  - 1. VOC Content: E Range of E1.
  - 2. Environmental Performance Rating: EPR 2.
- E. Interior Latex (Semi-gloss): MPI #54 (Gloss Level 5).
  - 1. VOC Content: E Range of E1.
  - 2. Environmental Performance Rating: EPR 2.
- F. Interior Latex (Gloss): MPI #114 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).
  - 1. VOC Content: E Range of E1.
  - 2. Environmental Performance Rating: EPR 2.

- G. Exterior Acrylic Latex (Flat): MPI #10 (Gloss Level 1).
  - 1. VOC Content: E Range of E1.
- H. Exterior Acrylic Latex (Semi-gloss): MPI #11 (Gloss Level 5).
  - 1. VOC Content: E Range of E1.

### 2.11 DRY FOG/FALL COATINGS

- A. Flat, Latex Dry Fog/Fall (MPI #118): Provide a water-based, emulsion-type, fast-drying coating used on overhead metal and other surfaces for application methods by airless and/or conventional spray equipment. Overspray will dry to a sweepable powder over a short distance for easier clean up.
  - 1. VOC Content: E Range of E1.
- B. Flat Dry-Fall for Galvanized Steel (water based) MPI # 133: Provide a waterborne coating, designed for direct application to cleaned, interior overhead galvanized metal surfaces, for application methods by airless and/or conventional spray equipment. Overspray will dry to a sweepable powder over a short distance for easier clean up.
  - 1. VOC Content: E Range of E1.
- C. WriteErase White Coating: Provide VOC compliant, water based. WriteErase White coating.
  - 1. Technical Information and Test Results:
    - a. Suitable Substrates: Gypsum board, smooth-sealed wood, previously painted surfaces and others in accordance with the manufacturer's recommendations.
    - b. Colors Available: White.
    - c. Coverage Rate: Small kit, 35 square feet per kit; medium kit, 60 square feet to 70 square feet per kit; large kit, 110 square feet to 130 square feet.
    - d. Finish: Gloss, 92 at 60 degrees.
    - e. Maximum VO: Less than 50 grams per liter, EPS Test Method 27.
    - f. Fire Rating: Class A or Class I, ASTM E84.
    - g. Scrub Resistance: 10,000+ scrub cycles, ASTM D2486.
    - h. Stain Removal: Excellent rating.
  - 2. Basis of Design: Product specified is "WriteErase White" as manufactured by Master Coating Technologies, Inc. Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect will be the sole judge of the basis of what is equivalent.
- D. Accessories: Provide accessories as recommended by the manufacturer, including, but not limited to, the following:
  - 1. Markers: "Low Odor or Bold Dry Erase Markers". Expo.
  - 2. Cleaner/Wipes: "Dry Erase Board Cleaner" or Wipes", Expo.

## 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. Concrete: 12 percent.
  - 2. Masonry (Clay and CMU): 12 percent.
  - 3. Wood: 15 percent.
  - 4. Plaster: 12 percent.
  - 5. 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. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. 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 surfaceapplied 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.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and re-prime substrate with compatible primers as required to produce paint systems indicated.
  - 2. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

- 3. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
- 4. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting
- D. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- F. Ferrous Metals: Clean un-galvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
  - 1. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
  - 2. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
  - 3. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Sand surfaces that will be exposed to view, and dust off.
  - 3. Prime edges, ends, faces, undersides, and backsides of wood.
  - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- I. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.
- J. Preparation:
  - 1. WriteErase White Coating: Gloves, goggles, and a respirator shall be worn when pouring and mixing. Thinning is not required for brush or roller application.
  - 2. Surface Preparation: Prepare surfaces to Level 5 smoothness in accordance with GA 214. For best results, prepare surface with a quality white primer or white eggshell finish. Primer/sealers and base coats may be brushed, rolled, or sprayed. Sprayed application is preferred in order to provide the smoothest surface for the application of the WriteErase White coating.

- a. Gypsum Board: Prepare to Level 5 finish for best results. Provide two base coats of manufacturer's recommended product. Ensure uniform color across surface.
- b. Primed Metal: Provide two base coats of manufacturer's recommended product.
- c. Unprimed Metal: Provide manufacturer's recommended primer and two base coats of manufacturer's recommended product.
- d. Previously-Pained Surfaces: Provide two base coats of manufacturer's recommended product.

## 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 items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. 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.
- E. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
  - 1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
  - 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
  - 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- F. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- G. Overhead Structure and Exposed Ceiling Steel and Galvanized-Metal Substrates:
  - 1. Prep substrate as required minimum. Repair existing primed surfaces.
  - 2. Galvanized surface shall be prepared by either solvent cleaning and test for chromate passivation, with an SSPC SP 7 Brush-off blast cleaning if required or chemical-etching cleaners may be substituted for solvent washing and SSPC-SP 7 cleaning.

- 3. Apply primer coat to unprimed surfaces.
- 4. Paint exposed metal deck, structural steel, conduit, un-insulated ductwork and piping, and other mechanical and electrical work in finish and occupied rooms. Protect surfaces not to be painted. Dry-Fall painting shall not be required in mechanical-electrical equipment, custodial, storage and similar rooms.
- H. Exterior Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed on exterior of building, excluding roof mounted mechanical and electrical work. Items to be painted include, but are not limited to, the following:
  - 1. Un-insulated metal and plastic piping, including hangers and supports.
  - 2. Louvers, grilles, vents unless pre-finished.
  - 3. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
  - 4. Conduit and junction boxes.
  - 5. Electrical equipment that is indicated to have a factory-primed finish for field painting.
  - 6. Do not paint unless noted otherwise.
    - a. Pre-finished mechanical equipment and items
    - b. pipe and duct insulation
    - c. Pre-finished electrical devices and/or cover plates
    - d. Electrical fixtures
    - e. Name places
    - f. Moving parts
  - 7. Touch up damaged finishes, including field applied and pre-finished surfaces.
- I. Interior Mechanical and Electrical Work: Unless otherwise noted, painting of mechanical and electrical work is limited to items exposed to view in finished spaces as defined herein.
  - 1. Locations where MEP work to be field painted include following
    - a. Occupied or Finish spaces are to include all rooms and other spaces with suspended, drywall or plaster ceiling, including toilet rooms and storage rooms. Also stairs, classroom and other rooms used by students
    - b. Occupied or Finished Spaces with ceilings Paint all exposed MEP work as described herein exposed to view.
    - c. Occupied or Finished Spaces without ceilings Paint all exposed MEP work as described herein exposed to view, including the structure above unless noted otherwise.
    - d. Occupied or Finished Spaces without ceilings (i.e., Egress Stairs, Gym, and Stage house), partial ceilings, and where indicated.
    - e. Unless noted otherwise, painting of MEP work is not required of Unfinished or unoccupied spaces include mechanical and electrical equipment rooms (rooms whose primary purpose is to house HVAC or other MEP equipt), elevator equipment rooms, IT equipt and MDF rooms, storage rooms without finish ceilings, shafts and chases.
  - 2. Items to be painted include, but are not limited to, the following:

- a. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
- b. Un-insulated metal and plastic piping
- c. Piping hangers and supports.
- d. Louvers grilles vents unless pre-finished
- e. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- f. Electrical equipment that is indicated to have a factory-primed finish for field painting.
- g. Conduit and junction boxes, including metallic and PVC materials, fire alarm, BAS, attachments <u>exposed and semi-exposed to view</u> in finish areas
- h. Electrical and control panels in finish areas and exposed to view
- 3. Do not paint, unless noted otherwise.
  - a. Pre-finished mechanical equipment and items
  - b. pipe and duct insulation
  - c. Pre-finished electrical devices and/or cover plates
  - d. Electrical fixtures
  - e. Name places
  - f. Moving parts
  - g. Sight exposed interior of ductwork and other equipment
- 4. Touch up damaged finishes, including field applied and pre-finished surfaces.
- J. WriteErase White Coating Application.
  - 1. Required Materials: Provide 9 inch (229 mm) lint-free <sup>1</sup>/<sub>4</sub> inch (6mm) nap roller cover, metal painters tray; low tack painters tape; and Part 1, Part 2, and a stir stick.
  - 2. Preparation over Existing Painted Surfaces: The surface shall be clean, dry, and free of grease and mildew. Since WriteErase White coating is a gloss finish, it will highlight any imperfections, so take the necessary steps to ensure a smooth surface prior to application. If repainting before applying Write Erase White coating, sand the existing surface to remove any high points or imperfections and fill any holes or scratches/ Apply white primer and white eggshell paint to it is as smooth as possible with very little stipple and no lap marks or roller lines. Allow to fully dry (let dry for a minimum of four hours depending on conditions) before applying WriteErase White coating dries quickly so remove tape while finish is still wet. Any material found under the painters tape shall be removed with a damp rag.
  - 3. Mixing: Stir mixture while pouring Part 1 into Part2. Mix thoroughly for 3 to 3 ½ minutes. As Part 1 and Part 2 are incorporated. Write Erase White coating shall begin to thicken. Make sure to incorporate unmixed paint on the sides of the can into the middle. Allow mixed WriteErase White coating to sweat-in for 5 minutes. Once Part 1 and Part 2 are mixed, Write Erase White coating shall be used in one hour. Do not combine multiple kits. Do not reseal cans once mixed, contents will expand.
  - 4. Application: Pour WriteErase White coating into a clean, metal tray and apply with a lint-free ¼ inch (6mm) nap, woven roller. Cut-in only as far as can be painted before the paint begins to dry. Roll vertically. Maintain a wet edge. Work in manageable 3 foot (914mm) to 4 foot (1219mm) sections. Inspect the application from multiple angles to

ensure uniform coverage and no pinholes. Surface shall be cured in five days. After curing for five days, wipe the surface with surface conditioner then buff with a clean cloth. Contact your distributer for application assistance.

- a. Open Time: One hour.
- b. Curing: Allow coating to cure for five days before using as a dry erase surface.

## 3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. 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.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

# 3.5 EXTERIOR PAINTING SCHEDULE

- A. CMU Substrates:
  - 1. Latex System: MPI EXT 4.2A.
    - a. Prime Coat: Interior/exterior latex block filler.
    - b. Intermediate Coat: Exterior latex matching topcoat.
    - c. Topcoat: Exterior latex (semi-gloss).
  - 2. Latex Over Alkali-Resistant Primer System: MPI EXT 4.2L.
    - a. Prime Coat: Alkali-resistant primer.
    - b. Intermediate Coat: Exterior latex matching topcoat.
    - c. Topcoat: Exterior latex (semi-gloss).
- B. Galvanized-Metal Substrates:
  - 1. Alkyd System: MPI EXT 5.3B.
    - a. Prime Coat: Cementitious galvanized-metal primer.
    - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
    - c. Topcoat: Exterior alkyd enamel (semi-gloss).
- C. Steel Substrates:
  - 1. Alkyd System: MPI EXT 5.1D.

- a. Prime Coat: Alkyd anticorrosive metal primer.
- b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
- c. Topcoat: Exterior alkyd enamel (Semi-gloss unless noted otherwise)
- 2. Alkyd System: MPI EXT 5.3B.
  - a. Prime Coat: Cementitious galvanized-metal primer.
  - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
  - c. Topcoat: Exterior alkyd enamel (Semi-gloss unless noted otherwise)

## 3.6 INTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
  - 1. Alkyd System: MPI INT 5.1E.
    - a. Prime Coat: Quick-drying alkyd metal primer where required
    - b. Intermediate Coat: Interior alkyd matching topcoat.
    - c. Topcoat: Interior alkyd (Semi-gloss unless noted otherwise)
  - 2. Water-Based Dry-Fall System: MPI INT 5.1C.
    - a. Prime Coat: Quick-drying alkyd metal primer where required.
    - b. Topcoat: Waterborne dry fall.
- B. Galvanized-Metal Substrates:
  - 1. Water-Based Dry-Fall System: MPI INT 5.3H.
    - a. Prime Coat: Waterborne dry fall where required
    - b. Topcoat: Waterborne dry fall.
  - 2. Alkyd System: MPI INT 5.3C.
    - a. Prime Coat: Cementitious galvanized-metal primer.
    - b. Intermediate Coat: Interior alkyd matching topcoat.
    - c. Topcoat: Interior alkyd (Semi-gloss unless noted otherwise).
- C. Wood Substrates: Including wood trim, architectural woodwork and windows.
  - 1. Latex System:
    - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.
  - 2. Institutional Low-Odor/VOC Latex System:
    - a. Prime Coat: Primer, latex, for interior wood, MPI #39.

- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.
- D. Dressed Lumber Substrates: Including architectural woodwork.
  - 1. Latex System: MPI INT 6.3T.
    - a. Prime Coat: Interior latex-based wood primer.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (semi-gloss).
- E. Gypsum Board Substrates:
  - 1. Latex System: MPI INT 9.2A.
    - a. Prime Coat: Interior latex primer/sealer
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex. (Refer to finish schedule for gloss level.)
- F. Cotton or Canvas Insulation-Covering Substrates: Including pipe and duct coverings
  - 1. Alkyd Over Latex Primer System: MPI INT 10.1B.
    - a. Prime Coat: Interior latex primer/sealer.
    - b. Intermediate Coat: Interior alkyd matching topcoat.
    - c. Topcoat: Interior alkyd (Flat)

END OF SECTION 099100

## SECTION 122413 - ROLLER SHADES

## 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 roller shades and motorized shade operators:
  - 1. Manually operated roller shades with single rollers.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.
- C. Samples for Initial Selection: For each colored component of each type of shade indicated.
  - 1. Include similar samples of accessories involving color selection.
- D. Product Certificates: For each type of roller shade, signed by product manufacturer.
- E. Qualification Data: For Installer.
- F. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining roller shades and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
  - 3. Operating hardware.

## 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Source Limitations: Obtain roller shades through one source from a single manufacturer.

### **ROLLER SHADES**

- C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-testresponse characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. Flame-Resistance Ratings: Passes NFPA 701.
- D. Product Standard: Provide roller shades complying with WCMA A 100.1.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory packages, marked with manufacturer and product name, fire-testresponse characteristics, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete 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 operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## 1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Rollers Shades: Before installation begins, for each size, color, texture, and pattern indicated, full-size units equal to 5 percent of amount installed.

### PART 2 - PRODUCTS

- 2.1 ROLLER SHADES : Dimension of 5' X 9'-0" provided for general information only. Contractor responsible for field survey and verification of dimensions and conditions
  - A. Basis-of-Design Product: Subject to compliance with requirements, provide MechoShade Systems, Inc; Mecho/5 Shade System, Vertical Style with Snap Loc Fascia or a comparable product by one of the following:
    - 1. Draper Inc.
    - 2. Hunter Douglas, Inc., Contract.

## **ROLLER SHADES**

- 3. Lutron Shading Solutions by VIMCO.
- B. Shade Band Material: Woven FR Vinyl.
  - 1. Fabric Width: As required to cover window without vertical seams.
  - 2. Pattern: Visually opaque vinyl/vinyl shade cloth Thermoveil 0700 Series.
  - 3. Style: Opaque vinyl/vinyl.
  - 4. Colors: To be selected from standard finishes.
  - 5. Material Openness Factor: 0 percent.
  - 6. Bottom Hem: Straight.
  - 7. Trim: As indicated by manufacturer's designation for style and color.
- C. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with manufacturer's standard method for attaching shade material. Provide capacity for two roller shade band(s) per roller, unless otherwise indicated in a window treatment schedule.
- D. Direction of Roll: Regular, from back of roller, and reverse, from front of roller, as indicated on Drawings for double-roller shades.
- E. Mounting Brackets: Galvanized or zinc-plated steel.
- F. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; length as indicated in a window treatment schedule; removable design for access. Surface mounted.
- G. Fascia End Caps: 1/8" (3mm) thick sheet steel wall or jamb mounted. Material and finish to match fascia.
- H. Top/Back Cover: L-shaped; material and finish to match fascia; combining with fascia and end caps to form a six-sided headbox enclosure sized to fit shade roller and operating hardware inside.
- I. Pocket-Style Headbox: U-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; with a bottom cover consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing shade roller, brackets, and operating hardware and operators within.
- J. Bottom Bar: Steel or extruded aluminum. Provide concealed, by pocket of shade material, internal-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.
- K. Mounting: permitting easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.
- L. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard for anchoring roller shade bottom in place and keeping shade band material taut.

- M. Shade Operation: Manual; with continuous-loop bead-chain, clutch, and cord tensioner and bracket lift operator.
  - 1. Position of Clutch Operator: Right side of roller, as determined by hand of user facing shade from inside, unless otherwise indicated in a window treatment schedule.
  - 2. Clutch: Capacity to lift size and weight of shade; sized to fit roller or provide adaptor.
  - 3. Lift-Assist Mechanism: Manufacturer's standard spring assist for balancing roller shade weight and lifting heavy roller shades.
  - 4. Loop Length: Length required to make operation convenient from floor level.
  - 5. Bead Chain: Stainless steel.
  - 6. Operating Function: Stop and hold shade at any position in ascending or descending travel.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.
  - 1. 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, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow clearances for window operation hardware.
- B. Connections: Connect motorized operators to building electrical system.

## 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.

## **ROLLER SHADES**

## 3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades. Refer to Division 1 Section Demonstration and Training."

END OF SECTION 122413

## SECTION 123553- WOOD LABORATORY CASEWORK

## 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 laboratory casework.
  - 2. Filler and closure panels.
  - 3. Laboratory countertops.
  - 4. Tables.
  - 5. Laboratory sinks.
  - 6. Laboratory accessories.
- B. Related Requirements:
  - 1. Section 024119 "Selective Demolition"
  - 2. Section 096513 "Resilient Base and Accessories" for resilient base applied to wood laboratory casework.
  - 3. Divisions 22, and 26 for devices provided by others

### 1.3 DEFINITIONS

- A. Exposed Surfaces of Casework: Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48 inches (1200 mm) above floor, and visible surfaces in open cabinets or behind glass doors.
  - 1. Ends of cabinets, including those installed directly against walls or other cabinets, are defined as "exposed."
  - 2. Ends of cabinets indicated to be installed directly against and completely concealed by walls or other cabinets are defined as "concealed."
- B. Semiexposed Surfaces of Casework: Surfaces behind opaque doors, such as cabinet interiors, shelves, and dividers; interiors and sides of drawers; and interior faces of doors. Tops of cases 78 inches (1980 mm) or more above floor and bottoms of cabinets more than 24 inches (600 mm) but less than 48 inches (1200 mm) above floor are defined as semiexposed.
- C. Concealed Surfaces of Casework: Include sleepers, web frames, dust panels, and other surfaces not usually visible after installation.

- D. MDF: Medium-density fiberboard.
- E. Hardwood Plywood: A panel product composed of layers, or plies, of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive and faced both front and back with hardwood veneers.

## 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
- B. Keying Conference: Conduct conference at [Project site] <Insert location>. Incorporate keying conference decisions into final keying requirements.

## 1.5 COORDINATION

- A. Coordinate layout and installation of framing and reinforcements for support of laboratory casework.
- B. Coordinate installation of laboratory casework with installation of laboratory and other equipment noted on the drawings.

## 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product
- B. Shop Drawings: For laboratory casework. Include plans, elevations, sections, and attachment details.
  - 1. Indicate types and sizes of cabinets.
  - 2. Indicate locations of hardware and keying of locks.
  - 3. Indicate locations of service fittings and required back boxes.
  - 4. Indicate locations of blocking and reinforcements required for installing laboratory casework.
  - 5. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and other laboratory equipment.
  - 6. Include coordinated dimensions for laboratory equipment specified in other Sections.
- C. Keying Schedule: Include schematic keying diagram, and index each key set to unique designations that are coordinated with the Contract Documents.
- D. Samples for Initial Selection: For cabinet finishes, counter top, exposed hardware and other materials requiring color selection submit manufacturer provided color charts and product data (photocopied versions of color charts are not acceptable)
- E. Samples for Verification: For each type of cabinet finish and each type of countertop material, in manufacturer's standard sizes, but min. 6"x6"

## 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Test Reports for Casework: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework with requirements of specified product standard.
- C. Product Test Reports for Countertop Surface Material: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory countertop surface materials with requirements specified for chemical and physical resistance.

### 1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish complete touchup kit for each type and color of wood laboratory casework provided. Include scratch fillers, stains, finishes, and other materials necessary to perform permanent repairs to damaged laboratory casework finish.
- B. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Cabinet Mounting Clips and Related Hardware: Quantity equal to 5 percent of amount installed, but no fewer than 20 of each type.

### 1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that produces casework of types indicated for this Project that has been tested for compliance with SEFA 8 W.

### 1.10 WARRANTY

- A. Furnish a written warranty that Work performed under this Section shall remain free from defects as to materials and workmanship for a period of three (3) years from date of acceptance. Defects in materials and workmanship that may develop within this time are to be replaced without cost or expense to the Owner. All non casework items supplied, but not manufactured by the selected manufacturer shall be covered under this warranty
  - Defects include, but are not limited to:
  - 1. Ruptured, cracked, or peeling veneer
  - 2. Discoloration or lack of finish integrity
  - 3. De-lamination of components or edge banding
  - 4. Slippage, shift, or failure of attachment to wall, floor, or ceiling
  - 5. Warping or unloaded deflection of components
  - 6. Failure of hardware

## 1.11 DELIVERY, STORAGE, AND HANDLING

A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

### 1.12 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install laboratory casework until building is enclosed, utility roughing-in and wet work are complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 Casework

- A. <u>Basis-of-Design Product</u>: CiF Lab solutions "E" series Premium Wood Case Work. Subject to compliance with requirements, comparable products by one of the following is acceptable:
  - 1. <u>Diversified Woodcrafts, Inc</u>.
  - 2. <u>Kewaunee Scientific Corporation; Laboratory Products Group</u>.
  - 3. <u>Thermo Fisher Scientific</u>.
- B. Source Limitations: Obtain laboratory casework from single source from single manufacturer unless otherwise indicated.
  - 1. Obtain countertops, sinks, accessories, from casework manufacturer.
- C. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Other manufacturers' laboratory casework of similar sizes and similar door and drawer configurations and complying with Specifications may be considered.
- 2.2 Tables
  - A. Basis of Design Product: Diversified Woodcraft 1544KF "Octagon Workstation with drawer base and flat top" 56"wide,56" deep, 36" high

## 2.3 PERFORMANCE REQUIREMENTS

- A. System Structural Performance: Laboratory casework and support framing system shall withstand the effects of the following gravity loads and stresses without permanent deformation, excessive deflection, or binding of drawers and doors:
  - 1. Work Surfaces (Including Tops of Suspended Base Cabinets): 160 lb/ft.

## WOOD LABORATORY CASEWORK

- 2. Wall Cabinets (Upper Cabinets): 160 lb/ft.
- 3. Shelves: 40 lb/sq. ft. .

## 2.4 CASEWORK, GENERAL

- A. Casework Product Standard: Comply with SEFA 8 W, "Laboratory Grade Wood Casework."
- B. 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.
- C. Low-Emitting Materials: Fabricate casework, including countertops, with adhesives and composite wood products containing no urea formaldehyde.

## 2.5 WOOD CASEWORK

- A. Design: Full Flush overlay with 1/8" reveal between intra-cabinet doors and drawers and 1/16" reveal at cabinet edge for offset of the hinge around the door and 1/8" reveal on adjacent cabinets.
  - 1. Doors and drawer fronts to be slightly eased at all edges
  - 2. No exposed fasteners without architect approval
  - 3. Balance filler size on each end
  - 4. Edge banding to be stick stock 5mm (3mm not acceptable) hardwood edge banding
  - 5. All hardwoods are to be air and kiln dried to a moisture content of 6-9 percent before use
- B. Wood Species: Red oak.
- C. Cut: Plain sliced/sawn.
- D. Matching:
  - 1. None required; select and arrange components for compatible grain and color.
  - 2. Provide veneers for each elevation from a single flitch, book and balance matched.
    - a. Provide continuous matching of adjacent drawer fronts within each cabinet and end matching between drawer fronts of adjacent cabinets.
- E. Grain Direction:
  - 1. Vertical on doors, horizontal on drawer fronts.
  - 2. Lengthwise on face frame members.
  - 3. Vertical on end panels.
  - 4. Side to side on bottoms and tops of units.
  - 5. Vertical on knee-space panels.
  - 6. Horizontal on aprons and table frames.
- F. Exposed Materials:

- 1. General: Provide materials that are selected and arranged for compatible grain and color. Do not use materials adjacent to one another that are noticeably dissimilar in color, grain, figure, or natural character markings.
- 2. Plywood: Hardwood plywood, either veneer core or particleboard core, made without urea formaldehyde with face veneer of species indicated. Grade A exposed faces, at least 1/50 inch (0.5 mm) thick, and Grade J crossbands. Provide backs of same species as faces.
- 3. Solid Wood: Clear hardwood lumber of species indicated.
- G. Semiexposed Materials:
  - 1. Provide solid wood or hardwood plywood for semiexposed surfaces unless otherwise indicated.
- H. Concealed Materials:
  - 1. Solid Wood: Any species, with no defects affecting strength or utility.
  - 2. Plywood: Hardwood plywood. Provide backs of same species as faces.
  - 3. Particleboard.
  - 4. MDF.
  - 5. Hardboard.

## 2.6 WOOD CABINET AND TABLE MATERIALS

- A. General:
  - 1. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
- B. Hardwood Plywood: HPVA HP-1, particleboard core except where veneer core is indicated made without urea formaldehyde
- C. MDF: ANSI A208.2, made with binder containing no urea formaldehyde
- D. Particleboard: ANSI A208.1, Grade M-2; made with binder containing no urea formaldehyde
- E. Hardboard: ANSI A135.4, Class 1 Tempered.
- F. Edgebanding for Wood-Veneered Construction: Minimum 1/8-inch- (3-mm-) thick, solid wood of same species as face veneer.
  - 1. Select wood edgebanding for grain and color compatible with face veneers.
  - 2. Colors: As selected by Architect from manufacturer's full range to match cabinet finishes.

### 2.7 AUXILIARY CABINET MATERIALS

A. Glass for Glazed Doors: Clear float glass complying with ASTM C 1036, Type I, Class 1, Quality-Q3; not less than 3.0 mm thick.

B. Glass for Glazed Doors: Clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.

# 2.8 OUNTERTOP [TABLETOP] [SHELF] [TROUGH] [AND] [SINK] MATERIALS

- A. Epoxy: Factory-molded, modified epoxy-resin formulation with smooth, nonspecular finish.
  - 1. Supplied by Casework and Table Manufacturer.
    - a. 1" Thick with rounded front edge and all corners, with square ends
    - b. 1" x 4" backsplash of same material at rear and end returns of case work tops, not tables
  - 2. Physical Properties:
    - a. Flexural Strength: Not less than 10,000 psi (70 MPa).
    - b. Modulus of Elasticity: Not less than 2,000,000 psi (1400 MPa).
    - c. Hardness (Rockwell M): Not less than 100.
    - d. Water Absorption (24 Hours): Not more than 0.02 percent.
    - e. Heat Distortion Point: Not less than 260 deg F (127 deg C).
  - 3. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:
    - a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), benzene, carbon tetrachloride, dimethyl formamide, ethyl acetate, ethyl alcohol, ethyl ether, methyl alcohol, nitric acid (70 percent), phenol, sulfuric acid (60 percent), and toluene.
    - b. Slight Effect: Chromic acid (60 percent) and sodium hydroxide (50 percent).
  - 4. Color: Black.

### 2.9 FABRICATION

- A. Cabinet and Table Construction: Provide wood-faced laboratory casework complying with SEFA 8 W. Cabinets ends are to be banded on all exposed and semi exposed surfaces
  - 1. Bottoms of Base Cabinets and Tall Cabinets: 3/4-inch- (19-mm-) thick, veneer-core hardwood plywood.
  - 2. Tops and Bottoms of Wall Cabinets and Tops of Tall Cabinets: 1-inch- (25-mm-) thick, veneer-core hardwood plywood.
  - 3. Ends of Cabinets: 3/4-inch- (19-mm-) thick, hardwood plywood.
  - 4. Shelves: 1-inch- (25-mm-) thick, veneer-core hardwood plywood.
  - 5. Base Cabinet Top Frames: 3/4-by-2-inch (19-by-50-mm) solid wood with mortise and tenon or doweled connections, glued and pinned or screwed.
  - 6. Base Cabinet Stretchers: 3/4-by-4-1/2-inch (19-by-114-mm) panel product strips or solidwood boards at front and back of cabinet, glued and pinned or screwed
  - 7. Exposed Backs of Cabinets: 3/4-inch- (19-mm-) thick, particleboard- or MDF- core hardwood plywood.

- 8. Unexposed Backs of Cabinets: 1/4-inch- (6.4-mm-) thick hardboard with white coated face dadoed into sides, bottoms, and tops.
- 9. Drawer Front, Sides and Backs: 1/2-inch- (12.7-mm-) thick, veneer-core hardwood plywood, with glued dovetail or multiple-dowel joints.
- 10. Drawer Bottoms: 1/4-inch- (6.4-mm-) thick, white thermo fused mealmine face MDF glued and dadoed into front, back, and sides of drawers
- 11. Doors[ 48 Inches (1200 mm) High or Less]: 3/4 inch (19 mm) thick, with particleboard or MDF cores and hardwood face veneers and crossbands.
- 12. Stiles and Rails of Glazed Doors[ 48 Inches (1200 mm) High or Less]: 3/4-inch- (19-mm-) thick, solid hardwood.
- 13. Stiles and Rails of Glazed Doors More Than 48 Inches (1200 mm) High: 1-1/16-inch-(27-mm-) thick, solid wood with hardwood face veneers.
- B. Filler and Closure Panels: Provide where indicated and as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as adjacent exposed cabinet surfaces unless otherwise indicated.

# C. Cubbies

- 1. Sizes as noted on drawings
- 2.  $\frac{3}{4}$ " hardwood plywood with banded edges

# 2.10 WOOD FINISH

- A. Preparation: Sand lumber and plywood before assembling. Sand edges of doors, drawer fronts, and molded shapes with profile-edge sander. Sand after assembling for uniform smoothness at least equivalent to that produced by 220-grit sanding and without machine marks, cross sanding, or other surface blemishes.
- B. Staining: Remove fibers and dust and apply stain to exposed and semiexposed surfaces as necessary to match approved Samples. Apply stain in a manner that produces a consistent appearance. Apply wash-coat sealer before applying stain to closed-grain wood species.
  - 1. Stain Color: As selected by Architect from manufacturer's full standard range.
- C. Chemical-Resistant Finish: Apply laboratory casework manufacturer's standard chemical-resistant, transparent finish. Sand and wipe clean between coats. Topcoat(s) may be omitted on concealed surfaces.
  - 1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8 W. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.

## 2.11 HARDWARE

A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.

- B. Butt Hinges: Stainless, five-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide two for doors 48 inches (1200 mm) high or less and three for doors more than 48 inches (1200 mm) high.
- C. Hinged Door and Drawer Pulls: stainless-steel back-mounted pulls. Provide two pulls for drawers more than 24 inches (600 mm) wide.
  - 1. Design: Wire pulls.
  - 2. Overall Size: 1 by 4inches.
- D. Door Catches: Nylon-roller spring. Provide two catches on doors more than 48 inches (1200 mm) high.
- E. Drawer Slides: Side mounted, epoxy-coated steel, self-closing; designed to prevent rebound when drawers are closed; complying with BHMA A156.9, Type B05091.
  - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Full-extension, ball-bearing type.
- F. Locks: Cam type with five-pin tumbler, brass with chrome-plated finish; complying with BHMA A156.11, Type E07281
  - 1. Provide a minimum of two keys per lock and two master keys.
  - 2. Provide on all drawers and doors.
  - 3. Keying: Key locks as directed.
  - 4. Master Key System: Key all locks to be operable by master key.
- G. Adjustable Shelf Supports: Powder-coated steel shelf rests complying with BHMA A156.9, Type B04013.

### 2.12 COUNTERTOPS, TABLETOPS AND SINKS

- A. Epoxy Countertops Tabletops and Sinks:
  - 1. Countertop Fabrication: Fabricate with factory holes for service fittings and accessories, and butt joints assembled with epoxy adhesive and concealed metal splines.
    - a. Countertop Configuration: Flat, 1 inch (25 mm)] thick, with rounded edge and corners, and with drip groove and applied backsplash.
    - b. Countertop Configuration: As indicated.
    - c. Countertop Construction: Uniform throughout full thickness
    - d. Tops to be manufacture red as one piece, cut to maximum length possible
  - 2. Tabletop Fabrication:
    - a. Tabletop Configuration: Flat 1 inch (25 mm)] thick, with rounded edge and corners, and with drip groove at perimeter.
    - b. Tabletop Construction: Uniform throughout full thickness.
  - 3. Sink Fabrication: Molded in one piece with smooth surfaces, coved corners, and bottom sloped to outlet and overflow; 1/2-inch (13-mm) minimum thickness.

- a. Provide sizes indicated or laboratory casework manufacturer's closest standard size of equal or greater volume, as approved by Architect.
- b. See Division 22 for sink faucets and fittings

## 2.13 LABORATORY ACCESSORIES

A. Pegboards: Polypropylene, epoxy, or phenolic-composite pegboards with removable polypropylene pegs and stainless-steel drip troughs with drain outlet.

## 2.14 WATER AND LABORATORY GAS SERVICE FITTINGS

- A. <u>Manufacturers</u>: See Specification Division 22 and MEP drawings for selection and work by others.
- B. Coordinate cabinet fabrication, including cutouts and reinforcing with fittings specified

## 2.15 ELECTRICAL AND COMMUNICATION SERVICE FITTINGS

- A. Service Fittings, See Specification Division 26 and MEP drawings for selection and work by others.
- B. Coordinate cabinet fabrication, including cutouts and reinforcing with fittings specified
- C. Provide back boxes and other accessories as necessary to receive fittings and devices specified

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION OF CABINETS

- A. Comply with installation requirements in SEFA 2.3. Install level, plumb, and true; shim as required, using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical. Do not exceed the following tolerances:
  - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
  - 2. Variation of Bottoms of Upper Cabinets from Level: 1/8 inch in 10 feet.
  - 3. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet .
  - 4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.

### WOOD LABORATORY CASEWORK

- 5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- B. Base Cabinets: Fasten cabinets to partition framing, wood blocking, or reinforcements in partitions, with fasteners spaced not more than 16 inches (400 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.
  - 1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches (600 mm) o.c. and at sides of cabinets with not less than two fasteners per side.
- C. Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 16 inches (400 mm) o.c.
- D. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- E. Adjust laboratory casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

## 3.3 INSTALLATION OF COUNTERTOPS

- A. Comply with installation requirements in SEFA 2.3. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where indicated on Shop Drawings.
- B. Field Jointing: Where possible, make in same manner as shop-made joints using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Shop prepare edges for field-made joints.
- C. Fastening:
  - 1. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches (1200 mm) o.c.
  - 2. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch (3 mm,) and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.
- D. Provide required holes and cutouts for service fittings.
- E. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
- F. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

### 3.4 INSTALLATION OF LABORATORY ACCESSORIES

- A. Install accessories according to Shop Drawings, installation requirements in SEFA 2.3, and manufacturer's written instructions.
- B. Securely fasten adjustable shelving supports, stainless-steel shelves, and pegboards to partition framing, wood blocking, or reinforcements in partitions.
- C. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.
- D. Securely fasten pegboards to partition framing, wood blocking, or reinforcements in partitions.

# 3.5 INSTALLATION OF SERVICE FITTINGS

- A. Comply with requirements in other Sections for installing water and laboratory gas service fittings and electrical devices.
- B. Install fittings according to Shop Drawings, installation requirements in SEFA 2.3, and manufacturer's written instructions. Set bases and flanges of sink- and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material. Securely anchor fittings to laboratory casework unless otherwise indicated.

# 3.6 CLEANING AND PROTECTING

- A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- B. Protect countertop surfaces during construction with 6-mil plastic or other suitable waterresistant covering. Tape to underside of countertop at a minimum of 48 inches o.c.

END OF SECTION 123553

### SECTION 210170: FIRE SUPPRESSION SPRINKLER SYSTEMS

### 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.
  - B. Codes and Standards listed below, apply to work indicated on the drawings and in the specifications.
    - 1. National Fire Protection Association (NFPA)
    - 2. Delaware State Fire Prevention Regulations
    - 3. American National Standards Institute (ANSI)
    - 4. American Society for Testing Materials (ASTM)
    - 5. National Electrical Manufacturer's Association (NEMA)
    - 6. Underwriters' Laboratories (UL)

#### 1.2 SUMMARY

- A. This Section includes fire-suppression sprinklers, piping, and equipment for the following building systems:
  - 1. Wet-pipe, fire-suppression sprinkler systems, including piping, valves, specialties and automatic sprinklers.
  - 2. Contractor shall provide schedule and location of all fire hose valve cabinets on sprinkler drawings regardless of which trade procures or installs them.
- B. Additional work includes, but is not limited to the following:
  - 1. Obtain and pay for all permits, licenses, approvals, reviews, utility shutdowns, water flow testing, pressure tests and acceptance inspections.
  - 2. Pipe sleeves through floors, walls and structural elements of the building, set in coordinated locations. Penetrations created in fire rated walls and floors, shall have their smoke stopping and fire rating integrity restored with the use of fire tested, U.L. listed details, that have prior approval of the local Fire Prevention Bureau.
  - 3. All cutting, coring and patching of general construction as necessary for installation of the work specified.
  - 4. Coordinated working drawings and hydraulic calculations from water flow test data less than one year old; submit and obtain approval by the local Fire Prevention Bureau and Owner's Insurance Underwriter, and State Fire Marshal.
  - 5. Clean-up, on a daily basis, of all debris associated with the installation of this work, as necessary to maintain the premises in a broom swept condition.

- 6. Testing, adjusting, retesting, re-adjusting as may be required to obtain system acceptance by the local Fire Prevention Bureau, Owner's Insurance Underwriter, State Fire Marshal and Owner's Representative. Fire Protection Contractor shall remain responsible for the fire protection systems until all approvals are obtained.
- 7. Provide equipment manuals, record drawings, valve tag schedules and personnel instruction, prior to system turnover to the Owner.
- 8. Provide fire protection on all floors during construction, utilizing temporary standpipes or fire extinguishers, according to the requirements of the authority having jurisdiction.
- 9. Performance of all work specified in this Section shall be in compliance with the requirements of the Occupational Safety and Health Act and Construction Safety Standards.
- C. The work in this Section includes providing all labor, materials, specialty products testing and services for, and reasonably incidental to, the satisfactory completion of the Fire Protection systems, as indicated on the Contract Drawings, in the Specification Sections, and as required by the applicable Codes and Standards.
- D. The following related work is specified in other Divisions and Sections of the specification.
- E. Related Sections include the following:
  - 1. Division 26 Section "Fire Alarm Systems" for alarm devices not in this Section.

## 1.3 DEFINITIONS AND INTERPERTATIONS

- A. Specific terminology used in the Design Drawings and Specifications shall have the following meanings;
  - 1. "Piping" includes pipe, fittings, flanges, valves, controls, hangers, supports, vents, drains and other customarily required items required in connection with the transfer of gases and fluids.
  - 2. "Install" includes unloading at the delivery point for the project and performing all tasks necessary to establish a secure mounting and correct operation, for items and assemblies furnished by other trades or the Owner.
  - 3. "Furnish" includes purchase and delivery to the project site, of items and assemblies, complete with every necessary appurtenance.
  - 4. "Provide" shall mean "Furnish and Install"
  - 5. "Concealed" when used in connection with the installation of piping, shall mean hidden from view behind chases, furred spaces, pipe shafts, or above suspended ceilings.
  - 6. "Concealed Combustible Spaces" shall be as defined in NFPA#13, Section 4-13.1.1, where the inside or near edges of combustible framing members is greater than 6", for roof trusses, floor joists, rated floor/ceiling assemblies, rated roof assemblies, wall studs, soffit or blind space framing.

- 7. "Contractor" shall mean the Fire Protection contractor and his vendors, fabricators or subcontractors.
- 8. "Design Drawings" shall mean documents, including drawings and written specifications, prepared by the Architects and Engineers, to obtain building permits and competitive bid proposals from contractors, for construction of the specified fire protection systems.
- 9. "Working Plans" shall mean documents, including calculations, drawings and material specifications prepared by the fire protection contractor, according to NFPA#13, for obtaining approval from the authority having jurisdiction, Owner's insurance underwriter, Architect/Engineer and the State Fire Marshal.
- 10. "NPS" shall mean nominal pipe size, in inches.
- 11. "Owner" shall mean Delaware Technical Community College.
- 12. "Architect" shall mean the Architect of Record as denoted in this package.
- 13. "Engineer" shall mean the Engineer of Record as denoted in this package.
- 14. "UL" means Underwriter's Laboratories
- 15. "Sprinkler System" shall mean piping and sprinklers under the individual control of a supervised control valve, with provisions for alarm annunciation, alarm testing and system drainage.
- 16. Reference applicable NFPA Standards for additional definitions that shall apply to work under this Section.
- B. The use of the Design Drawings and Specifications by the contractor, for Bid Proposal and Working Drawing preparation, shall include the following understandings:
  - 1. The information included in the drawings and specifications is given as a guide only, to indicate general design feasibility and to show an acceptable arrangement of system zones, system types, sprinkler positions, main piping location and equipment layout.
  - 2. The design drawings utilize symbols and diagrams to indicate required work, representing only the sequence of items to be installed, which have no dimensional significance and do not indicate every required item to be provided. The work shall be installed in accordance with the diagrammatic intent expressed on the drawings, in conformity with the dimensions indicated on the final architectural and structural working drawings, and final equipment shop drawings. Information regarding general construction shall be derived only from the Architectural and Structural Design Drawings and Specifications.
  - 3. The drawings and specifications are complementary and are to be utilized together for a complete interpretation of the work intended. The higher capacity or standard shall be provided, where conflicts between the drawings and specifications, or conflicts within themselves, occur.

- 4. The limitations of the language used on the drawings and specifications shall not be interpreted as meaning that accessories and appurtenances, required for completion of work, are to be excluded. The description of any item, on the drawings or in the specifications or both, requires the installation of all it's necessary components for approved, satisfactory operation. These drawings do not indicate sprinkler head locations. The Contractor shall reference the architectural reflected ceiling plans. The intent is to establish an architecturally acceptable arrangement of sprinklers with other ceiling elements including lights, diffusers, speakers etc., to be repeated in similar areas. Provide sprinklers according to the NFPA#13 occupancy hazard classification and spacing rules, for unfinished ceiling area.
- 5. Submission of a bid proposal requires the contractor to review all project documents and visit the construction site, to be thoroughly familiar with all requirements for the project, and identify in his bid, conditions that may affect the efficient and satisfactory performance of the work. Claims for additional compensation shall be denied if the above procedures are not followed and the disputed conditions may have been identified by the completion of these required tasks.
- 6. The information shown on the design drawings and written in the specifications shall not be interpreted as to instruct the contractor to not follow the applicable codes or local amendments. Where the information provided is believed not to be in conformance with the code requirements, the contractor shall notify the Architect and Engineer for clarification prior to the submission of his bid proposal.
- 7. References to providing sprinklers per the NFPA#13 Standard mandates that all building areas shall be provided with complete, full sprinkler protection, unless specific notation is made to the contrary on the drawings or in the specification.
- 8. References in this Specification to NFPA Standards as design and installation guidance of fire protection systems, invoke all of the Sections, Subsections, Exceptions and Advisory Provisions of the Standard that are applicable to the Project's requirements; they are hereby included in this Specification as if repeated in their entirety, and are referenced to convey the minimum acceptable performance and installation requirements acceptable.

## 1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Design sprinkler system piping according to the following requirements and obtain approval from authorities having jurisdiction, Owner's insurance underwriter, Architect, Engineer and State Fire Marshal. Refer to Section 1.7 QUALITY ASSURANCE, paragraph I., Working Plans and Hydraulic Calculations, and Section 3.1 PREPARATION WORKING OF PLANS, for additional system performance related design requirements.
- B. Design sprinkler system piping according to the following:
  - 1. Include 10 psi cushion pressure as a margin of safety in available water flow and pressure calculations.
  - 2. Include losses from point of connection to city watermain, through water-service entrance, backflow preventer, sprinkler system piping, including all valves, fittings and devices.
  - 3. Maximum piping velocity shall be limited to 20 fps.

#### FIRE SUPPRESSION SPRINKLER SYSTEMS

- 4. Sprinkler Occupancy Hazard Classifications shall be as follows:
  - a. Classrooms, Art Rooms, Music Rooms, Multi-Purpose Room: Light Hazard
  - b. Offices, Corridors, Toilet rooms, Locker rooms, Public Areas, Cafeteria Seating Areas: Light Hazard
  - c. Building Service Areas, Kitchen, Janitor's Closets, Electrical and Telephone Equipment Rooms and Closets, Mechanical Equipment Rooms: Ordinary Hazard, Gp. 1.
  - d. General Storage Areas, Stage Loading Docks: Ordinary Hazard, Gp. 1.
  - e. Combustible construction and Combustible concealed spaces: Light Hazard.
  - f. All other occupancies and hazards not noted, shall be in accordance with NFPA.
- 5. Minimum Density for Automatic-Sprinkler Piping Design shall be as follows:
  - a. Light Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area unless otherwise indicated on drawing data schedule.
  - b. Ordinary Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area unless otherwise indicated on drawing data schedule.
  - c. Ordinary Hazard, Group 2 Occupancy: 0.20 over 1,500 sq. ft. area unless otherwise indicated on drawing data schedule.
  - d. Combustible construction and Combustible concealed spaces: 0.10 gpm over 1500-sq. ft. area unless otherwise indicated on drawing data schedule.
  - e. Special Occupancy Hazard: As determined by authorities having jurisdiction.
- C. Components and Installation shall be capable of producing piping systems with 175-psig minimum working-pressure rating, unless otherwise indicated.

## 1.5 SUBMITTALS

- A. The contractor shall provide Submittals according to Section 15010, with all required drawings, calculations and product data for complete review of the proposed system installation submitted at the same time. Incomplete submittals shall be returned unreviewed. When resubmittals are required, all changes from the original submittal shall be clearly identified with revision triangles and clouds.
- B. Product Data shall be provided for the following:
  - 1. Pipe and fitting materials and methods of joining for sprinkler piping.
  - 2. Pipe hangers and supports.

- 3. Valves, including specialty valves, accessories, and devices.
- 4. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
- 5. Fire stopping product materials and U.L. listed installation details for penetrations of firerated walls and floors.
- C. Sprinkler Piping Drawings: Working plans and hydraulic calculations, shall be prepared according to NFPA #13, and submitted to the authorities having jurisdiction, Owner's insurance agent, Architect, Engineer, and State Fire Marshal for approval.
- D. Maintenance Data: shall be submitted for each type of sprinkler component and specialty, and included in the maintenance manuals, specified in Division 1.
- E. Record Drawings: Refer to Division 1 for requirements. An up to date set of working drawings shall be kept at the site to record minor change in the intended system installation, as as-built conditions. Provide the required copies of final working drawings, corrected to show all as-built conditions, to the Owner, and the Owner's insurance agent upon completion of the project.
- F. Guarantee: The contractor shall submit a written guarantee of all materials and workmanship for a period of one (1) year, beginning at the date of final acceptance or beneficial use to the Owner, which includes emergency repair service for sprinkler systems, within four (4) hours, on a twenty-four (24) hour, seven (7) day a week basis, upon request for repair service by the Owner.

## 1.6 QUALITY ASSURANCE

- A. All materials, specialty products, equipment, methods of installation, and the application of materials and products in specific situations, shall be in strict accordance with the applicable requirements of NFPA #13 and 14, and have the prior approval of the authority having jurisdiction. All materials and equipment shall be U.L. labeled and/or F.M. approved, and installed in accordance with their listings.
- B. Installer Qualifications: An experienced installer who has designed and installed fire-suppression systems similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.
- C. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's and/or Fire Marshal's "Fire Protection Equipment Directory" and that comply with other requirements indicated.
- D. Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.

## 1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounting steel cabinet and hinged cover, with space spare sprinklers plus sprinkler wrench. Include the minimum number of each type of sprinkler in the project, as required by NFPA #13.

#### 1.8 LEAK DAMAGE

A. The fire protection contractor shall be responsible during the installation and testing of the sprinkler system(s), for damage to building, it's contents, the work of other trades etc., caused by leaks or overflow from equipment, defective valves, disconnected or unplugged pipes, fittings etc., and shall pay for the repair or replacement of work or facilities damaged by such leaks.

## 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:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Specialty Valves and Devices:

Vicatulic Corp. of America Tyco Fire Suppression & Building Products Reliable Automatic Sprinkler Co., Inc. Viking Corp.

2. Sprinklers:

Tyco Fire Suppression & Building Products Reliable Automatic Sprinkler Co., Inc. Viking Corp. Victaulic Co. of America

3. Keyed Couplings for Steel Piping: (Grooved Fittings)

Tyco Fire Suppression & Building Products Victaulic Co. of America. Viking Corp.

## 2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials in specific fire protection services. All piping shall be permanently marked continuously along its length by the manufacturer, properly identifying the type of pipe. All fittings shall be stamped or embossed by the manufacturer, indicating the size, pressure rating, and U.L. listing or F.M. approval.

#### 2.3 PIPES AND TUBES

- A. Standard-Weight Steel Pipe: ANSI/ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 6 and smaller, and Schedule 30 in NPS 8 and larger, may be joined with threads or cutgroove couplings and fittings, for pressures up to 300 psi.
- B. Schedule 30 Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and equal to or greater than Schedule 30, or ASTM A 795 and ASME B36, 10M, Schedule 30 wrought-steel pipe, may be joined by welding or roll-groove couplings and fittings, for pressures up to 300 psi.
- C. "THINWALL/SCHEDULE 10," "XL" AND CPVC piping shall <u>not</u> be permitted on this project.

## 2.4 PIPE AND TUBE FITTINGS

- A. Cast-Iron Threaded Flanges: ASME B16.1.
- B. Cast-Iron Threaded Fittings: ASME B16.4.
- C. Malleable-Iron Threaded Fittings: ASME B16.3.
- D. Steel, Threaded Couplings: ASTM A 865.
- E. Steel Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.
- F. Steel, Grooved-End Fittings: UL-listed and approved, ASTM A 47, malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.
- 2.5 JOINING MATERIALS
  - A. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for pipe-flange gasket materials and welding filler metals.
  - B. Steel, Keyed Couplings: UL 213 and AWWA C606, for steel-pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gaskets, and steel bolts and nuts. Include listing for dry-pipe service for couplings for dry piping.

## 2.6 SPRINKLERS

- A. Utilize quick-response sprinklers throughout Light and Ordinary Hazard occupancies
- B. Automatic Sprinklers: shall have heat-responsive element complying with the following:

UL 199, for applications except residential. UL 1767, for early suppression, fast-response applications.

C. Sprinkler Types and Categories: Nominal 1/2-inch standard orifice, unless otherwise indicated or required by application.

#### FIRE SUPPRESSION SPRINKLER SYSTEMS

D. Sprinkler types, features, and options include the following:

Horizontal Dry/Sidewall & Dry pendent sprinklers. Pendent sprinklers. Quick-response sprinklers. Sidewall sprinklers. Upright sprinklers.

- E. Sprinkler Finishes: Upright bronze, and "white" painted pendents and sidewalls.
- F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

Ceiling Mounting: White-plated steel, two piece, flat. Ceiling Mounting: Metal, white finish, two piece, flat. Sidewall Mounting: White-plated steel, two piece, flat. Sidewall Mounting: Metal, white finish, two piece, flat.

## PART 3 – EXECUTION

#### 3.1 PIPING APPLICATIONS

- A. Flanges, unions, transitions and special fittings shall have pressure ratings the same as or higher than system's static pressure rating for use in aboveground applications, unless otherwise indicated.
- 3.2 JOINT CONSTRUCTION
  - A. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping joint construction. Apply joint compound or tape to male threads only.
  - B. Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with cut or roll-grooved ends and Schedule 30 with only roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.
  - C. Locking-Lug-Fitting, Twist-Locked Joints: Follow fitting manufacturer's written instructions.
  - D. Dissimilar-Piping-Material Joints: Construct joints using adapters or couplings compatible with both piping materials. Use dielectric fittings if both piping materials are metal. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for dielectric fittings.

# 3.3 PIPING INSTALLATION

- A. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

#### FIRE SUPPRESSION SPRINKLER SYSTEMS

- 1. Deviations from approved working plans for piping installation require written approval from authorities having jurisdiction. File copy of written approval with Architect before deviating from approved working plans.
- C. Use only approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes. Bushings shall not be used.
- D. Install sprinkler piping to avoid excessive auxiliary drains. Provide auxiliary drains as required for complete drainage of trapped piping sections.
- E. Hangers and Supports: Comply with NFPA #13 for hanger materials and installation. Hangers, hanger rods and attachments must be capable of supporting five (5) times the weight of the water-filled pipe, plus 250 pounds minimum, at each point of hanging. Piping shall be supported from building structure only, and shall not be hung from ductwork, conduit runs or other piping. Install piping straight and true, parallel with building walls, without dips or sags. Piping shall bear evenly on all pipe hangers. Provide complete details of earthquake bracing and flexible couplings consistent with the requirements of the seismic zone of the project location.
- F. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.

## 3.4 SPRINKLER APPLICATIONS

- A. General: Only new sprinklers shall be installed, according to their listing requirements. Ornamental finishes shall be factory applied only. Position sprinkler deflectors at the same elevation, parallel with ceiling plane.
- B. Use sprinklers according to the following applications:
  - 1. Rooms without Ceilings: Upright sprinklers.
  - 2. Rooms with Suspended Ceilings: Pendent, sprinklers.
  - 3. Wall Mounting: Sidewall sprinklers.
  - 4. Spaces Subject to Freezing: Upright; pendent, dry-type; and sidewall, dry-type sprinklers.
  - 5. Special Applications: Use quick-response sprinklers where indicated.
  - 6. Sprinkler Finishes: Use sprinklers with the following finishes:
    - a. Upright, Pendent, and Sidewall Sprinklers: White-plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

#### 3.5 SPRINKLER INSTALLATION

- A. Install sprinklers in patterns indicated. Install sprinklers in suspended ceilings in center of acoustical panels and tiles.
  - 1. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical panels, and quarter points of the long dimension.

- B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space,
- C. Install approved sprinkler guards at all sprinklers installed below 7'-6", or where mechanical damage is possible.
- D. Install sprinklers in accordance with manufacturer's requirements.
- 3.6 LABELING AND IDENTIFICATION
  - A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA #13 and in Division 22 Section "Basic Mechanical Materials and Methods."

## 3.7 CLEANING

- A. Clean dirt and debris from sprinklers, remove protective covers used during painting.
- B. Remove and replace sprinklers having paint other than factory finish.

#### 3.8 **PROTECTION**

A. Protect sprinklers from damage until Substantial Completion.

## 3.9 COMMISSIONING

- A. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.
- B. Verify that specified tests of piping are complete.
- C. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.
- D. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.
- F. Fill wet-pipe sprinkler piping with water.
- G. Fill antifreeze system with proper antifreeze/water mixture and verify mixture after fill.
- 3.10 DEMONSTRATION
  - A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
  - B. Schedule demonstration with Owner with at least seven days' advance notice.

## END OF SECTION 210170

#### FIRE SUPPRESSION SPRINKLER SYSTEMS

#### SECTION 220000: GENERAL PROVISIONS - PLUMBING/FIRE PROTECTION

#### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and all other applicable Divisions, apply to work of this Section.
- B. This specification or drawing and the design features or resulting construction disclosed, are the property of Furlow Associates, Inc., and shall not be reproduced without written permission.
- C. All fire protection suppression systems shall be part of and included in all of the following 220000 thru 220191 Sections.
- D. Refer to Section 07841 for Through-Penetration Firestop Systems.
- E. Refer to Section 08311 for Access Doors and Frames.
- 1.2 WORK INCLUDED
  - A. Provide labor, materials, equipment and supervision necessary to install complete operating Plumbing and Fire Protection Systems as indicated the drawings and specified herein, including all work at the site and within the proposed construction areas to accomplish the required work.
- 1.3 REGULATIONS, CODES AND STANDARDS
  - A. Work shall be performed in accordance with latest adopted codes, regulations and ordinances by authorities having jurisdiction. Observe all safety regulations.
  - B. Latest editions of any referenced standards shall govern.
  - C. Obtain all municipal and/or the Authorities Having Jurisdiction permits and inspection certificates and pay all charges.
  - D. Make or arrange for any/or all inspection agency reviews or visits and pay all charges. This includes communication with each respective agency and/or utility to verify the project system work, coordination responsibilities, fees, back charges, etc., required.
  - E. All fees and back charges shall be verified during the bidding phase of the work. Any discrepancy of this item between any utility, inspection agency and the Contractor shall be brought to the attention of the A/E prior to bid opening.
  - F. Submission of a bid will be deemed evidence of having complied with these requirements.

#### 1.4 RELATED WORK

- A. Refer to equipment shown or specified in all other applicable Divisions that require Plumbing and Fire Protection services.
- B. Refer to work related to Plumbing and Fire Protection as shown on the following contract drawings:

Architectural & Structural HVAC Electrical

## 1.5 COORDINATION

- A. The Mechanical, Plumbing and Electrical Contractors are responsible to coordinate all manufacturer's recommended circuit breakers, starters, disconnects and fuse sizes for all equipment. Submission of a shop drawing will certify that this has been completed. Any necessary changes required will be included as part of this contract.
- B. Plumbing and Sprinkler Contractors shall coordinate scheduling, submittals and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of independent work elements, with provisions to accommodate items that may be installed at a later time.
- C. Plumbing and Sprinkler Contractors shall verify utility requirements and all characteristics of operating equipment are compatible with the building utilities. Coordinate the work of all sections related and required for installing, connection and placing in service of all equipment.
- D. Plumbing and Sprinkler Contractors shall coordinate all space requirements, supports and installation of all mechanical, electrical, plumbing and fire protection work, which are indicated diagrammatically on the Drawings. Verify routing of all pipes, ducts, conduits and equipment connections. Maximize accessibility for other work, and service requirements for maintenance and repairs. Develop overall coordination drawing (all trades) and submit for review prior to fabrication/installation.
- E. Obtain written confirmation from all related trade Contractors and the Owner or his representative that requirements, conflicts and coordination issues have been discussed and resolved.
- F. Coordination of Trades in the Field: The Sheet Metal Contractor shall take precedence and, therefore, shall develop his shop drawings first. These then will be used to overlay the other trades. Next shall be the mechanical piping, plumbing, fire sprinkler and electrical in the order stated. Drawings shall be 3/8" in scale. Initial meeting of contractors shall be convened prior to start of drawings to work out layout, breakdown of building and other details. All drawings shall be completed in CAD with a format compatible and convertible to DWG files. At the end of the effort, each contractor shall provide a full set of shop drawings to each of the other contractors and three sets to the construction manager. Devices requiring access for maintenance shall not be infringed upon by adjacent trades. Coil pull allowances shall be shown on drawings.

## 1.6 SUBMITTALS

A. Shop Drawings & Product Data:

1. Shop drawings and product data shall be submitted in accordance with Division 22 specifications except where herein modified.

# **NOTE:** Submittals will only be reviewed once and resubmittals will be reviewed once. Any other submittals will be billed to the Contractor at the Engineer's standard rates.

- 2. Listed are the required shop drawings and reports required for this project. The Engineer/Owner shall reserve the right to require additional submissions not listed below:
  - All fixtures, equipment and associated devices so listed on the Fixture Schedule on Drawing P-500.
  - Insulation
  - All specified piping systems.
  - All specified valves.
  - Gauges and thermometers
  - Hanger and supports including Sumner system.
  - Piping labels and identification.
  - Sprinkler System and all related data, devices, switches and trimmings.
  - Testing reports.
  - Sterilization report.
  - Operating/Maintenance manuals.
  - As-Built Drawings.
- 3. Submittals comprising complete catalog cuts, shop drawings and performance test data for Plumbing materials and equipment as required by other sections of Division 22, shall be submitted for review checking. The Contractor shall review these for conformance to contract documents prior to submission and affix contractor's signature to each submittal certifying that this review has been done. By approving and submitting shop drawings, product data, samples and similar materials, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction data that relates to the work, and has checked and coordinated this information with all of the requirements contained in the contract documents for the work of all trades.
- 4. All submittals shall have the following identification data, as applicable, contained therein or permanently adhered thereto.
  - a. Project name.
  - b. Project number.
  - c. Sub-contractor's, vendor's and/or manufacturer's name and address.
  - d. Product identification.
  - e. Identification of deviation from contract documents.
  - f. Applicable contract drawings and specification section number.
  - g. Shop drawing title, drawing number, revision number, and date of drawing and revision.

- h. Resubmit revised or additional submittals as requested.
- i. Wherever shop drawings or vendor's standard data sheets indicate work to be done "by others", it shall be the responsibility of the contractor making the submission to identify by name, the contractor who is to do this work. If the contractor named is other than the contractor making the submission, the shop drawing submission must be reviewed by the named contractor and bear his mark of approval, prior to submission to the Architect/Engineer.
- j. Where equipment proposed differs from that shown on the drawings or specified, he shall submit for approval drawings showing the manner in which the layout is affected by the substitution.
- k. The Contractor shall keep one copy of approved shop drawings at the job site,, filed in a suitable metal container. The shop drawings shall be cataloged and kept in good repair, and shall be available for use by the Owner, Architect and Engineer.
- 1. No equipment shall be ordered, fabricated, etc., before approval of shop drawings.
- B. Contractor is responsible for the shop drawing coordination and interface with the work of other contracts and adjacent work. The relationship of Contractor's work shall be verified as it relates to adjacent and critical features of the work of this and all contracts and materials.

#### 1.7 WARRANTY/GUARANTEE

- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in all other applicable Divisions. In addition, refer to specifications for special guarantees.
- B. Wherever in the specification sections of this division, reference is made to a specific warranty period, this warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the contract documents.

#### 1.8 SITE INSPECTION

- A. The Contractor shall visit the site, inspect, and become aware of all conditions which may affect the work during the estimation phase of his work and prior to bid openings. Investigate utilities, protection requirements for adjacent facilities, storage locations, and access to the construction area.
- B. Submission of a bid will be deemed evidence of having complied with this requirement.

## 1.9 SUBSTITUTIONS

A. Whenever a material, article, piece of equipment or system is identified in the following specification or indicated on the drawings by reference to manufacturers' or vendors' names, trade names, catalog numbers or the like, it is so identified for the purpose of establishing the basis of the Bid.

- B. Substitution approval must be obtained and included as an addendum item prior to the submission of the bid. An approved substitution shall not be considered as an approval for the Contractor or an equipment vender to deviate from the written portion of the specifications unless so stated in the addendum.
- C. The drawings illustrate the space allocated for equipment and the Contractor shall install the equipment accordingly. If changes are required in the building or arrangement due to substitution of equipment, the Contractor making the substitution must pay for the necessary modifications.
- D. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements as indicated on all contract documents and as described within the specifications. This shall include, but shall not be limited to space requirements, code clearances, the type, horsepower, capacities, number and size of services required from other trades, including all required ancillary items furnished and installed by other trades. If the manufacturer or related bidding contractor does not comply with these requirements, then they shall be responsible for any and all additional costs associated with the changes required by other trades.

## 1.10 LUBRICATION

- A. Furnish, install and maintain all required lubrication of any equipment operated prior to acceptance by the Owner. Lubrication shall be as recommended by the equipment manufacturer.
- B. Provide one year's supply of lubricants to Owner at date of acceptance.
- C. Verify that required lubrication has taken place prior to any equipment start-up.
- 1.11 EQUIPMENT START-UP
  - A. Verify proper installation by manufacturer or his representative.
  - B. Advise General Contractor 2 days prior to actual start-up.
  - C. Verify proper operation. Obtain signed statement by manufacturer or his representative that equipment is operating within warranty requirements. Submit statement to General Contractor.

## 1.12 OPERATION & MAINTENANCE INSTRUCTIONS

- A. Properly and fully instruct Owner's personnel in the operation and maintenance of all systems and equipment.
- B. Insure that the Owner's personnel are familiar with all operations to carry on required activities.
- C. Such instruction shall be for each item of equipment and each system as a whole.
- D. Provide report that instruction has taken place. Include in the report the equipment and/or systems instructed, date, contractor, Owner's personnel, vendor, and that a complete operating and maintenance manual has been reviewed.
- E. Manual shall include all instructions on operation, maintenance, repair parts list, lubrication

## **GENERAL PROVISIONS – PLUMBING/FIRE PROTECTION**

requirements, brochures, catalogue cuts, wiring diagrams, piping diagrams, control sequences, service requirements, names and addresses of vendors, suppliers and emergency contacts. Three manuals shall be provided.

- F. Submit manuals for review prior to operating instruction period. Manuals shall be 8-1/2 x 11" with hard cover, suitably bound.
- G. Provide to the Owner any special tools necessary for operation and routine maintenance of any of the equipment.

## 1.13 TOOLS

A. All equipment furnished by the Contractor which requires special tools or devices other than those normally available to the maintenance or operating staff shall be furnished in duplicate to the Owner, sufficiently marked, packed or boxed for staff usage. The tools provided shall be listed by the Contractor identified as to their use or the equipment applicable in a written transmittal to the Owner.

## 1.14 CLEANING AND FINISHING

- A. After equipment start-up and all operating tests have been made and the system pronounced satisfactory, each respective Contractor shall go over the entire project, clean all equipment, etc., installed by him and leave in a clean and working condition. Any surfaces found marred after this final cleaning shall be refinished or replaced by each Contractor at no cost to the Owner.
- B. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage. Provide adequate and proper storage facilities during the progress of the work. Special care shall be taken to provide protection for bearings, open connections, pipe coils, pumps, compressors and similar equipment.
- C. All NEW fixtures, piping, finished surfaces and equipment installed shall have all grease, adhesive labels and foreign materials removed.
- D. All new piping installed shall be drained and flushed to remove grease and foreign matter. Pressure regulating assemblies, traps, flush valves and similar items shall be thoroughly cleaned. Remove and thoroughly clean and reinstall all liquid strainer screens after the system has been in operation ten (10) days.
- E. Gas piping shall be blown out with clean compressed air or inert gas.
- F. When connections are made to existing systems, the Contractor shall do all cleaning and purging of the existing systems required to restore them to the condition existing prior to the start of work.
- G. Clean-up: Remove from the premises, all unused material and debris resulting from the performance of work under this section.

#### PART 2 – PRODUCTS

#### 2.1 GENERAL

- A. All material and equipment shall be new and of present day manufacture, and shall conform to accepted standards of the trade where such a standard has been established for the particular type of equipment or material.
- B. Whenever equipment or material is referred to in the singular, such as "the plumbing fixture", it shall be deemed to apply to as many such items as necessary to complete the work.

## 2.2 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. During loading, transporting and unloading exercise care to prevent damage to material.
- B. Store all materials in dry enclosures or under protective coverings out of way of work progress.
- C. Material shall not be allowed to be stored directly on ground.
- D. Deliver in manufacturer's original cartons or on skids.
- E. Handle and protect so as to prevent damage to product or any surrounding material.

#### 2.3 CONCRETE

- A. Concrete if used on this project, shall be in accordance with Section 033000.
- B. The 28-day minimum compressive strength shall be 3000 psi.

#### PART 3 - EXECUTION

- 3.1 **PROTECTION** 
  - A. Plug or cap open ends of piping systems.
  - B. Stored materials shall be covered to prevent damage by inclement weather, sun, dust or moisture.
  - C. Protect all installed work until accepted in place by the Owner.
  - D. Plates, polished metal escutcheons and other finished devices shall not be installed until masonry, tile, and painting operations are complete unless otherwise protected.
  - E. Protect all work from operations which may cause damage such as hauling, welding, soldering, painting, insulating and covering.
  - F. Do not remove protective material until equipment is placed in service.

#### 3.2 WORKMANSHIP

- A. Install all work neat, trim and plumb with building lines.
- B. Install work in spaces allocated.
- C. Cutting and patching shall be performed by skilled tradesmen normally employed for the work involved.
- 3.3 FASTENERS, HANGERS AND SUPPORTS
  - A. Furnish and install all hangers and supports required to suspend, mount, or hang the work.
  - B. Furnish and install all miscellaneous steel angles, channels, beams, clips, brackets and anchors necessary to hang or support the work. Provide submissions for review.
  - C. Install concrete inserts before concrete is poured.
  - D. Drilled inserts shall not be loaded more than 1/4 rated capacity or 200 pounds.
  - E. Power-driven fasteners shall not be allowed for piping larger than 2 inch, or equipment. When used they shall not be loaded more than 1/8 rated capacity or 200 pounds.
  - F. All hangers, miscellaneous steel, braces and supports shall be galvanized, cadmium plated, or primed steel. Copper tubing shall be supported with copper hangers. No direct contact of dissimilar metals between the piping system and its hanger support shall be permitted.
  - G. Piping shall be supported from adjustable clevis type hangers with insulation pipe saddles. Where hangers are 18" or longer, provide lateral bracing at every fourth hanger. See IPC Pipe Support Table below:

|                         | Horizontal | Vertical  |
|-------------------------|------------|-----------|
| Material                | Max. Feet  | Max. Feet |
| ABS Pipe                | 4          | 10        |
| Aluminum                | 10         | 15        |
| Brass                   | 10         | 10        |
| Brass Tube up to 1-1/4" | 6          | 10        |
| Brass Tube over 1-1/2"  | 10         | 10        |
| Cast Iron               | 5          | 15        |
| Copper up to 1-1/4"     | 6          | 10        |
| Copper over 1-1/4"      | 10         | 10        |
| Steel Tubing            | 8          | 10        |
| Steel Pipe              | 12         | 15        |

PIPE SUPPORT SPACING

H. Support vertical piping at floor levels using approved riser clamps. Clamp material shall be compatible with pipe material. Maximum vertical spacing shall be10'-0".

## 3.4 SLEEVES

- A. Provide each pipe passing through a masonry or concrete wall, floor or partition with a sleeve made from standard weight steel pipe for pipe with smooth edges, securely and neatly cemented in place. Provide each pipe passing through a frame or metal partition with a sleeve made from No. 22 gauge galvanized sheet metal, securely fastened in place.
- B. Pipe passing through foundation wall or under foundation shall be provided with relieving arch or steel pipe per IPC Section 305.5.
- C. Be responsible for the proper location and alignment of all sleeves.
- D. Provide hydrostatic seals for sleeves passing through outside walls, below grade, or through hydrostatically sealed slabs or floors on grade. Provide fire-rated seals for all other sleeves.
- E. Install both piping and sleeve seals so as to maintain integrity of seals with expansion and contraction of piping.
- F. Set floor sleeves flush with floor surface in finished areas, 1" above the finished floor in kitchens, cafeterias, and similar service areas unless such areas are slab-on-grade; 1" above the floor in mechanical rooms, pipe chases, pipe spaces and other unfinished areas, unless otherwise indicated, and flush with the underside of slabs. Extend wall and partition sleeves through and cut flush with each surface unless otherwise indicated or specified.
- G. Select sleeves two pipe sizes larger than any pipe that is to remain uncovered, unless otherwise required by the sealing method specified. Where pipes are to be covered, provide sleeves large enough to allow the covering to pass through the sleeves with sufficient clearance for sealing as specified hereinafter. Size sleeves for branch piping from vertical risers large enough to permit vertical expansion at the riser.
- H. Place sleeves imbedded in concrete floors or walls in the forms before concrete is poured; sleeves shall have integral waterstop flanges, where they are to receive either watertight or hydrostatic seals.
- I. Install sleeves passing through above-grade floors of mechanical rooms, toilet rooms, kitchens or similar service areas where liquid leaks or spillover may occur in a watertight manner. Sleeves shall be such that waterproofing membrane can be flashed around and into the sleeve where necessary.
- J. Seal sleeves for pipes passing through ceiling air plenum walls or the floor above air tight in a manner similar to that specified for fire-rated sleeves.
- K. Hydrostatic Sealing Method: Provide compressible synthetic rubber seals, equivalent to LINK SEAL, manufactured by the Thunderline Corporation, or THRUWALL manufactured by O.Z. Gedney. Install seals in accordance with the manufacturer's recommendations to provide air tightness aboveground and hydrostatic sealing belowgrade. Caulking or other type mastic is not acceptable.
- L. Fire-Rated Sealing Method:
  - 1. Fire stopping of all thru-penetrations of fire and/or smoke rated assemblies (partitions, floors, ceilings, etc.) shall be the responsibility of each installer or building trade (Mechanical, Plumbing,

Electrical, Communications, Data, etc.) making the thru-penetrations, unless otherwise indicated on the Architectural series drawings (A-series). It is the responsibility of the Contractor making the thru-penetrations to verify and coordinate fire stopping with fire rating, assembly type and field conditions.

- 2. Sleeves, openings and sealants shall comply with applicable codes, recommended practices and standards, and manufacturer's instructions. Fire sealants shall have ability to prevent spread of flame, smoke or water throughout the penetration and shall pass 3 hour test, UL test ASTM E814 and UL 1479.
- 3. Products: Refer to Division 7 of the specifications for Fire Stopping Requirements.

## 3.5 PLATES

- A. Furnish and install chrome plated plates wherever piping passes into finished area.
- B. Plates shall be securely fastened to piping or building construction.
- C. Floor plates shall cover 1 inch sleeve extension.
- 3.6 OFFSETS, TRANSITIONS, MODIFICATIONS
  - A. Furnish and install all offsets necessary to install the work and to provide clearance for other trades.
  - B. Maintain adequate headroom and clearance.
  - C. Incidental modifications necessary to the installation of the systems shall be made as necessary and as approved by the Architect.
- 3.7 RECESSES
  - A. Furnish information to the General Contractor as to sizes and locations of recesses required to install panels, boxes, and other equipment or devices which are to be recessed in walls.
  - B. Make offsets or modifications as required to suit final locations.
- 3.8 LABELING
  - A. All Plumbing equipment such as pumps, and devices requiring identification for operating procedures shall be provided with permanent black laminated micarta white core labels with 3/8 inch letters.
  - B. This shall also apply to all controllers, remote start/stop pushbuttons and equipment cabinets.
- 3.9 FLASHING AND COUNTERFLASHING
  - A. Roof drains, vents, roof curbs, etc., shall have counterflashing fittings. General Contractor shall provide flashing.

- B. Piping and conduit thru the roof shall be flashed by the General Contractor. Furnish and install counterflashing.
- 3.10 ACCESS
  - A. Locate all equipment, valves, devices and controllers which may need service in accessible places.
  - B. Where access is not available, access panels shall be provided. Furnish access doors to the General Contractor for installation.
  - C. Access doors shall be Elmdor, Karp Co., MIFAB or Controlled Air Manufacturing Limited, with 16 gauge frames and 14 gauge steel door, prime painted.
  - D. Maintain required access clearances.

#### 3.11 WIRING

- A. Packaged plumbing system equipment shall be furnished with disconnect switches, and magnetic starters, factory furnished and wired by the unit manufacturer.
- B. All control wiring shall be furnished and installed under this Division of the work.
- C. All wiring shall be in accordance with the National Electrical Code and as recommended by the equipment manufacturer.

## 3.12 UTILITIES

- A. Do not interrupt any utility or service to the Owner without adequate previous notice and schedule.
- B. Arrange and pay for the relocation, disconnection or removal of, or relocate, disconnect or remove existing utilities and services where such work is shown or where such utilities or services interfere with new construction, whether or not shown. Provide all excavation, backfilling and paving required by such work.
- C. Perform alteration of utilities and services in accordance with the rules, regulations and requirements of the involved utility companies, regulatory agencies having jurisdiction.

## 3.13 CUTTING AND PATCHING EXTERIOR SURFACES

- A. This Contractor shall be responsible for returning disturbed paved and/or grass areas to original condition where excavation for utilities has been required.
- B. Cut and patch paved areas to match original surface.
- C. Properly tamp backfill before finishing or repairing disturbed area surfaces.

#### 3.14 OPENINGS - CUTTING, REPAIRING

- A. This contractor shall cooperate with the work to be done under other sections in providing information as to openings required in walls, slabs and footings for all piping and equipment, including sleeves where required.
- B. Any drilling or cutting required for the performance of work under this Section, shall be the responsibility of this Contractor and the cost thereof shall be borne by him.
- C. Holes in Concrete: Sleeves shall be furnished, accurately located and installed in forms before pouring of concrete. This contractor shall pay all additional costs for cutting of holes as the result of the incorrect location of sleeves. All holes through existing concrete shall be either core drill or saw cut. All holes required shall have the approval of the Structural Engineer prior to cutting or drilling.
- D. It shall be the responsibility of this Contractor to ascertain that all chases and openings are properly located.

## 3.15 GUARANTEE

A. All materials and equipment provided and/or installed under this section of the specifications shall be guaranteed for a period of one year from the date of acceptance of the work by the Owner unless otherwise specified in other applicable Divisions. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall furnish all necessary labor and materials to correct the trouble without any cost to the Owner. Any defective materials or inferior workmanship noticed at time of installation and/or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner.

In the event of occupancy by the Owner prior to final acceptance of the project, the guarantee date for equipment placed in operation shall be mutually agreed to by the Contractor and the Owner's representative.

#### 3.16 DRAWINGS

- A. The Plumbing and Fire Protection Systems are indicated on the Contract Drawings. Certain pertinent information and details required by the Plumbing and Fire Protection Work appear on the Architectural, Structural and Electrical Drawings; become familiar with all Drawings; and incorporate all pertinent requirements.
- B. Drawings are diagrammatic and indicate the general arrangement of systems and requirements of the Work. Do not scale Drawings. Exact locations of fixtures and equipment, not specifically shown shall be obtained before starting work.
- C. When indicated on the drawings, plumbing riser diagrams are completely diagrammatic and indicate the intent of the work for both the Contractor, L&I review agencies and/or Authorities Having Jurisdiction. Where valves, shock absorbers, incidental equipment, devices, etc., including execution notes are indicated on the riser diagrams, they shall be so required and installed as part of the system work.

#### 3.17 RECORD DRAWINGS

A. As-Built record drawings, showing dimensions, locations and depth of all buried and concealed piping, plugged outlets and equipment shall be kept up to date. Master copy shall be kept on the job. No backfilling of trenches shall be permitted until as-built drawings are approved as up-to-date by the Owner/Representative. No plumbing progress payments shall be approved unless as-built drawings are up- to-date. Depth of sewers shall be from a permanent bench mark as shown on the contract drawings. Refer to project record drawings under General Conditions.

END OF SECTION 220000

#### SECTION 220010: BASIC MATERIALS AND METHODS - PLUMBING

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this Section.

#### 1.2 REFERENCE

A. Install all piping, fixtures, equipment, etc., to meet the requirements of the following:

New Castle County Department of License and Inspection New Castle County Department of Sewers New Castle County Plumbing Code State of Delaware Fire Marshal's Office NATIONAL Plumbing Code International Plumbing Code (All applicable sections) International Mechanical Code (All applicable sections) International Fuel Gas Code (All applicable sections) Gas Utility Company Water Company NFPA OSHA

All requirements of the above governing agencies shall be in compliance with the latest issues, rules or regulations in effect.

- B. Appliances and materials governed by UL requirements shall meet such requirements and bear the label.
- 1.3 QUALITY ASSURANCE
  - A. Provide adequate supervision of labor force to assure all aspects of specifications are being fulfilled.
  - B. Insure that all work and equipment is installed in accordance with manufacturer's warranty requirements.
  - C. Replace all pipes and fittings shown to be defective as a result of testing.

## 1.4 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 220000.

- B. Submit the following:
  - 1. Manufacturer's Product Data on all pipe and fittings to be used in project.
  - 2. Manufacturer's Product Data on all valves to be used in project.

## 1.5 WARRANTY/GUARANTEE

A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

## PART 2 – PRODUCTS

- 2.1 STEEL PIPE & FITTINGS
  - A. Pipe: ASTM A-53, seamless, Schedule 40.
  - B. Fittings:
    - 1. Cast iron, threaded, 175 psi, ANSI B-16.4.
    - 2. Malleable iron, threaded, ASA B 16.3.
    - 3. Steel, socket weld, ASTM A-53.
    - 4. Wrought iron, socket weld, ASTM A-72.
  - C. Thread tape shall be teflon tape, 3 mils minimum thickness. Teflon tape shall not be permitted for use on gas piping systems.
  - D. See Section 220130 for Gas Piping Systems.
- 2.2 CAST IRON PIPE AND FITTINGS (Note: Any cast iron piping made or marked "CHINA" will NOT be acceptable on this project)
  - A. Aboveground:
    - 1. Pipe & Fittings: Hubless cast iron, CISPI 301, ASTM A-74 and ASTM A-888 shall be marked with the collective trademark of the Cast Iron Institute (soil pipe).
    - 2. Joints: Neoprene sleeve and stainless steel shield and clamp assembly, CISPI 310, ASTM-1277.
  - B. Below grade and/or slab: (Contractor's Option)
    - 1. Bell and Spigot: Service weight bell and spigot pattern ASTM-74 with compression type neoprene gaskets ASTM C-564.
    - 2. Hubless: Hubless cast iron pipe CISPI 301, with heavy duty 3.04.016 stainless steel bands for below-grade installation. Elastomeric seal component ASTM C-564 and CSA B-602.
    - 3. Hubless Joints: Cast iron CISPI 310 and as TM C-1277.

- 4. Corrosion protection shall be in accordance with IPC 305.1. Provide appropriate wrapping or sheathing when pipe is exposed to lime and acid of concrete, cinder or other corrosive materials.
- 5. Protection of all below-grade storm and sanitary shall be in accordance with IPC Section 305.
- C. Corrosion protection shall be in accordance with IPC 305.1. Provide appropriate wrapping or sheathing when piping is exposed to lime and acid of concrete, cinder or other corrosive materials.
- 2.3 COPPER TUBING
  - A. Domestic hot, cold and recirculated water:
    - 1. Aboveground:
      - a. Tubing: Hard-drawn, seamless ASTM B-88, Type "L".
      - b. Fittings: Solder joint wrought copper ANSI B-16.22.
      - c. Joints: Lead-free solder 410°, ASTM B-32 alloy designation "TC", ASTM B-828.
      - d. Flux: Non-toxic and non-corrosive, ASTM B-813.
    - 2. Underground:
      - a. Tubing: Soft-drawn, seamless ASTM B-88, Type "K".
      - b. Fittings: Solder joint wrought copper ANSI B-16.22.
      - c. Joints: Lead-free solder 410°, ASTM B-32, ASTM B-828.
      - d. Flux: Non-toxic and non-corrosive, ASTM B-813.
  - B. Drainage and vent piping:
    - 1. Aboveground:
      - a. Tubing: Hard-drawn seamless ASTM B-88, ASTM B-75, Type "M" and DWV as pipe size permits.
      - b. Fittings: Solder joint cast copper drainage type ANSI B-16.29.
      - c. Joints: Soldered, 95/5 tin-antimony ASTM B-828, ASTM B-32.
      - d. Flux: Non-toxic and non-corrosive, ASTM B-813.
  - C. Solder/Flux: See Paragraph 3.4 of this section for Soldering/Brazing.
- 2.4 VALVES (Copper Systems) Solder ends of Threaded
  - A. Valves listed below shall be for domestic water systems and comply with the latest requirements of NSF 61-8. Refer to individual sections for gas valves.
  - B. Ball Valves: NIBCO two piece, full port, 600 psi WOG rated, cold non-shock valve with reinforced TFE seals, 316 stainless steel ball, Eco-brass body, ASTM 584, Alloy C87850, solder ends, or threaded non-blowout stem design. Acceptable NIBCO figure numbers: T/S 685-80-66-LF; T/S 595-Y-66-LF (3 piece).

- C. Check Valves: NIBCO Class 125, Eco-brass body, ASTM 584, Alloy C87850, swing type, Y Pattern, threaded cap access. Acceptable NIBCO figure number: T/S 413-LF.
- D. Gate Valves: NIBCO Class 125, Eco-Brass body, ASTM 584, Alloy C87850, Rising Stem. Acceptable NIBCO figure number: T/S 113-LF.
- E. Balance Valves: All balance valves shall be provided with a memory stop feature with calibrated name plate to assure specific valve setting. Bronze body/brass ball, carbon filled TFE seat rings. NIBCO, Bell & Gosset, Accu-Flow, Taco or Flow Design "Accusetter". Acceptable NIBCO figure numbers: T/S 1710, F/G 737.
- F. Strainers:
  - Class 125 Bronze Y-Strainer, body to be ASTM B584 or B62 bronze with threaded, solder or female press end connections and .033 inch perforated type 304 stainless steel screen or 20 mesh type 304 stainless steel screen accessible without removing the strainer from the line. Acceptable Figure numbers: NIBCO Fig. S/T-221, S/T-222, PF-221/222-A,B.
  - 2. Class 125 Flanged Cast Iron Y-Strainer, body to be ASTM A-126 Class B cast iron. End connections to be Class 125 flanged, tapped bolted bonnet with plug. Screen shall be .033 inch perforated type 304 stainless steel screen or 20 mesh type 304 stainless steel screen accessible without removing the strainer from the line. Acceptable Figure numbers: NIBCO Fig. F 721-A.
  - Class 250 Threaded Cast Iron Y-Strainer: Strainer body to be ASTM A-126 Class B cast iron. End connections to be Class 250 threaded, tapped screw-in bonnet with plug. Screen shall be .033 inch perforated type 304 stainless steel screen or 20 mesh type 304 stainless steel screen accessible without removing the strainer from the line. Acceptable Figure numbers: NIBCO Fig. T-751-A
- G. VALVES (Copper Systems) Press Fit
  - 1. Valves listed below shall be for domestic water systems and comply with the latest requirements of NSF-61-8.
    - a. 2 Inch and Smaller Ball Valves (On/Off):

Ball Valves with male or female press to connect shall be rated at 200 PSI CWP to +225°F maximum. Valves shall be manufactured in accordance with MSS SP-110 and constructed of dezincification resistant cast bronze bodies. Brass with more than 15% zinc shall not be approved. Valve shall have reinforced PTFE Seats, Blow-out Proof Stem, Full Port Ball, Chrome/Nickel Plated or Stainless Steel Ball for aggressive water.

b. 2 Inch and Smaller Check Valves (Swing Type):

Check valves shall be swing type Y pattern with male or female press to connect ends and shall be rated 200 PSI CWP to + 250°F maximum. Valves shall be manufactured in accordance with MSS SP-80. Body & cap shall be manufactured of dezincification resistant cast bronze ASTM B62 or ASTM B584 Alloy C8440. Valves shall have PTFE seat disc.

c. 2 Inch and Smaller Check Valves (Lift or Spring Type):

Incline resilient disc, spring actuated, 250psi rating, non-shock cold working pressure, 2500F maximum working temperature, bronze ASTM B584 alloy C84400. Stainless steel stem and disc holder and spring, EDPM O-ring.

- H. Insofar as possible, all valves of the same type shall be of the same manufacturer.
- I. Valve Manufacturers: Subject to compliance with requirements, provide valves of one of the following:

Apollo/Conbraco Stockham Nibco Milwaukee Watts Hammond Webstone

- J. System Application:
  - 1. Domestic Water:
    - a. Check Valves 2" & Smaller threaded or soldered.
    - b. Ball Valves 3" & Smaller threaded or soldered.
    - c. Balance Valves All sizes threaded.
    - d. Butterfly Valves 4" and larger flanged.
    - e. Butterfly Valves 3" and smaller wafer type.

#### 2.5 THERMOMETERS

- A. Separable socket, inserted into fluid flow, adjustable, hermetically sealed, red mercury, die-cast, baked enamel finish, double strength glass lens, white scale and black graduations.
- B. Scale: Select range of thermometer to indicate normal operating temperature at mid-point of scale for domestic water systems.
- C. Manufacturer: U.S. Gauge, H.O. Trerice, Moeller, Duro.
- 2.6 GAUGES
  - A. Phosphor bronze bourdon tube, polypropylene case, gasketed glass crystal, aluminum dial, black graduations 4-1/2 inch diameter.
  - B. Range: 0 to 150 psi, 5 pound intervals, 1/2 pound graduations.
  - C. Manufacturers: Danton, U.S. Gauge, H.O. Trerice, Moeller.
  - D. Install with bronze gauge cock.

#### 2.7 ISOLATING FITTINGS

- A. Furnish isolating fittings between all sections of dissimilar piping materials or piping, general supports, equipment and supports, including piping hanger and rack supports where one material is ferrous and the other is non-ferrous.
- B. Install copper or brass piping or tubing in such a way as not to touch or come in contact with ferrous metals.
- C. Where ferrous piping or equipment is connected to copper or brass piping, make connection with insulating or dielectric unions to prevent electrolytic action between the ferrous and non-ferrous metals.
- D. Where copper or brass piping, tubing or fittings are anchored to, supported by or may come in contact with ferrous metal construction, provide an insulating nonconductor spacer of rubber, fiber or equivalent material to assure prevention of electrolysis.
- E. Manufacturer: Epco Sales, Inc., or insulated unions by Central Plastic Co.
- 2.8 ANCHORS AND GUIDES
  - A. Anchors and guides shall be provided to support and maintain pipes in position and properly distribute expansion. The anchors and guides must be securely fastened to the building structure, and must be completely installed before the system is tested.
  - B. Guides shall be as manufactured by J.J. McNally, Inc., Flexonics, Inc., Tube-Turns, American District Steam Co.
- 2.9 UNIONS
  - A. Up to and including 2 inch pipe size: Screwed pattern, bronze-to- bronze seat.
  - B. Above 2 inch pipe size: 125 Class Flanged pattern, A.S.A. sweat copper fitting, with gaskets, bolts and nuts.
  - C. Copper tubing unions shall have sweated type ends. Flanged unions on copper tubing may be soldered connections.
  - D. Materials and pressure ratings shall be the same as specified for the respective pipe and fitting system unless otherwise specified.

## PART 3 - EXECUTION

## 3.1 PIPING SYSTEM INSTALLATION REQUIREMENTS

A. Drawings are generally diagrammatic and due to small scale, it is impossible to indicate all fittings, valves, gauges and specialties required. Provide complete operating systems and all necessary fittings, valves gauges and specialties whether or not indicated.

- B. Install all piping in accordance with the best practices of the trade and latest code requirements. Use uniform system materials throughout the building. All branch take-offs shall be off the top of the pipe.
- C. Pipe and fittings shall be clean from cutting burrs, foreign materials and defects in structure and threading. Make all cuts square. Ream after cutting. Clean off scale and dirt inside and outside, before assembly. Remove welding slag or other foreign material.
- D. Keep all piping as high as possible, consistent with proper pitch, to maintain maximum headroom. Cut piping accurately to measurements established at the building, work into place without springing, forcing or cutting of the building structure, and install as directly as possible between connecting points parallel with or at right angles to building construction, except as required to obtain pitch.
- E. Unless otherwise shown, run piping within the building, concealed in the walls, furred spaces, pipe spaces or above suspended ceilings. Unless otherwise noted, do not build in or bury horizontal piping in partitions. Install all exposed piping as closely as possible to walls, ceilings and columns, consistent with access and applicable insulation requirements.
- F. This project includes a return air plenum ceiling. Regardless of materials specified, all system piping and/or materials shall be non-combustible and shall be in full compliance with the requirements set forth in the IPC.
- G. All piping to drain to low points. Low points will be provided with drain valves with hose thread. All piping shall have high points vented with ball valve, nipple and threaded cap.
- H. Do not install trapped lines where water cannot be drained or air can accumulate without being vented.
- I. Piping shall run square with building lines.
- J. Piping shall not be insulated or covered until tested and until building is closed in.
- K. Necessary drains, off-sets, vents and drips shall be provided for coordination of the work as part of the contract.
- L. Piping shall not be installed over electrical transformers, panels, switchgear, substations, and control panels as per the National Electric Code. No piping shall be installed in elevator machine rooms unless it is directly related to the room's system equipment.
- M. Allow clearance for expansion and contraction.
- N. Install isolating fittings between sections of ferrous and non- ferrous pipe or connected equipment.
- O. Valves shall be installed with stems above horizontal.
- P. Valves shall be installed on all sides of equipment and control valves to allow isolation for repair.
- Q. Do not support piping from other piping, conduits or equipment. Provide additional bracing to prevent movement of trapeze piping, or any singular run of pipe to fixtures. Provide additional bracing on all piping through walls to flush valves to prevent movement during normal operation or performing maintenance on valves.

- R. Thermometers and gauges shall be installed where indicated on the drawings, required by equipment specifications and where indicated elsewhere in the specifications. Gauges shall be located at an elevation that can be readable.
- S. Unions shall be provided adjacent to all valves, at equipment connections, and where necessary to facilitate dismantling of the piping system.
- T. Ball valves to be installed with the proper clearance for operating the valve handle. A minimum clearance of 10" from center of valve to wall must be maintained for ease of operation.
- U. Thermometers are to be located so they can easily be seen from the floor in front of unit. Make final adjustment by tilting thermometer. Locate bulb in waterway with an oversized tee or elbow fitting.
- V. Install pressure gauges on incoming services both domestic water and fire services. Locate pressure gauge after main shut-off valve and ahead of water meter if one is provided within building.
- W. All pipe unions installed shall be accessible. Unions shall not be concealed or located in places where they cannot be maintained.
- X. Support and bracing of 4" and above pipe shall be in accordance with the CISPI Standards and IPC Chapter 3.
- 3.2 TAGS, CHARTS, AND IDENTIFICATION
  - A. All piping shall be labeled in accordance with IPC 303.1 and 303.4.
  - B. Identify each valve in all systems with black, numbered and stamped 1-1/2" brass or aluminum tags fastened to valve by brass chain and S-hook.
  - C. Piping Identification: Provide identification and safety products, semi-rigid plastic, wraparound pipe markers with flow arrows and conforming to ANSI A13.1. Locate marker at each valve, changes in direction, where pipes pass thru barriers and every 25' of horizontal runs. Lettering on background shall be in accordance with the following colors:

| Legend                                     | Background | Lettering |
|--|------------|-----------|
| 1. Gas                                     | - Yellow   | - Black   |
| 2. Fire Protection                         | - Red      | - White   |
| 3. Domestic Cold Water                     | - Green    | - White   |
| 4. Domestic Hot Water (110° ^ 140°)        | - Yellow   | - Black   |
| 5. Domestic Hot Water Return (110° ^ 140°) | - Yellow   | - Black   |
| 6. Sanitary Drainage                       | - Green    | - White   |
| 7. Vent                                    | - Yellow   | - Black   |

- D. Provide 1/8" scale diagrams showing location, number and service or function of each tagged item.
  - 1. Frame diagrams in approved metal frames with clear acrylic front, hinges, and locks.
  - 2. Secure to wall in Mechanical Room.
  - 3. Provide two additional separate copies permanently covered and bound.

E. Available Manufacturers: Subject to compliance with requirements, manufacturer's offering identification markers which may be incorporated in the work are limited to the following:

Seton Brimar B-Line Marking Services, Inc.

- 3.3 WELDING
  - A. All concealed and inaccessible black steel piping shall be welded.
  - B. All black steel piping larger than 2 inch shall be fusion welded.
  - C. All elbows, tees and branch connections shall be made with welding fittings ANSI B16.9.
  - D. Welding shall be in accordance with the ASME Boiler and Pressure Vessel Code Section IX.
  - E. Furnish welder test certificate for review. Certificates of successful qualification by the following organizations shall be acceptable.
    - 1. ASME Boiler and Pressure Vessel Code
    - 2. ANSI Code for Pressure Piping
    - 3. National Certified Pipe Welding Bureau
    - 4. Military Specification MIL-STD-248

## 3.4 SOLDERING/BRAZING

- A. Connections between copper tubing and copper sweat fittings shall be made by soldering using Taramet Sterling or approved substitute. Flux shall be non-corrosive type "Nokorode" or approved substitute or as recommended by the manufacturer of the solder.
- B. All solder shall be "lead nickel and antimony free" in accordance with the Federal Safe Drinking Water Act Amendments of 1986 and 1996 as is ASTM B-32 Grade TC.

Composition:

| Tin                 | 95%        |
|---------------------|------------|
| Copper              | 4.0 - 5.0% |
| Selenium            | .042%      |
| Tensile Strength    | 7,130 psi  |
| Shear Strength      | 5,970 psi  |
| Melting temperature | 410°F      |

C. Tubing shall be cut square and then reamed and deburred. End of tubing and inside of fitting cup shall be cleaned with steel wool and the flux shall be applied to the clean surface before soldering. After soldering, the excess solder shall be wiped off while still plastic.

- D. Silver brazing alloy shall be equal to and shall be used for joints in:
  - 1. Medical Gas Piping (All Systems)
  - 2. Medical Vacuum Piping
- E. Brazed Joints:
  - 1. All brazed joints shall be cleaned. An approved flux shall be applied; joint filler metal shall conform to AWS A5.8.
  - 2. Flux shall meet AWS Standard A5.31, Type F83-A or F83-C.
- F. 410 solder shall be used for all joints in:
  - 1. Domestic cold water
  - 2. Domestic hot water
  - 3. Domestic hot water return
  - 4. Copper drainage piping
  - 5. Plant compressed air
- G. Lead-Tin (50-50) solder or any solder containing lead shall NOT be used or permitted for joint connections on this project.
- H. Where the silver brazing is performed in a confined non-ventilated space, a non-toxic, cadmium-free brazing alloy such as Stay-Brite shall be used instead of Easy-Flo. Bring joint to solder temperature or brazing temperature in as short a time as possible.
- I. Form continuous solder bead or brazing filler bead around entire circumference of joint.
- J. Wipe excess solder from joint area while solder is still plastic.
- K. Solder joints shall be in accordance with IPC Section 605.2, 605.14.3 and ASTM B838. Flux shall conform to ASTM B-813.
- 3.5 PRESS-FIT SYSTEM
  - A. All new domestic water piping installed on this project shall be a solderless, press-fit, domestic water system. The system shall be Viega/Rigid copper press fitting system. Fittings shall be rated 0 to 250 at 200 psi and tested to 600 psi.
  - B. Fittings shall meet ANSI/NSF 61, ASME B-16.22 and ASTM B88. Elastomeric seals shall meet ASTM D-2000.
  - C. Mechanical joining shall be recognized by:

IPC International Plumbing Code SBCCI Standard Plumbing Code IAPMO Uniform Plumbing Code PHCC National Standard Plumbing Code

- D. Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press end shall have SC (Smart Connect) feature design (leakage path). Smart Connect<sup>™</sup> (SC Feature). In ProPress ½" to 4" dimensions, the Smart Connect Feature assures leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. This feature shall provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.
- E. Press Connections: Copper press fitting joints shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.
- F. Installer shall be a qualified installer, licensed within the jurisdiction, and familiar with the installation of ProPress copper press joint systems. ProPress copper press fittings shall be installed using the proper tool, actuator, jaws and rings as instructed by the press fitting manufacturer. The installation of copper tubing for hot and cold water distribution systems shall conform to the requirements of the ICC International Plumbing Code or IAPMO Uniform Plumbing Code.
- G. Note: Viega Press-fit installation shall only be permitted on this project. Push-on shark-teeth, or any type connection fittings that are not Press-Fit, shall NOT be approved.
- H. T-drill mechanically formed tee fittings shall be used in conjunction with the ProPress Copper System in accordance with the IPC Chapter 6 Section 605.5.1, 605.5.1.2 and 605.14.1. Use caution around combustible material and follow all safety guidelines for open flame during silver brazing.

END OF SECTION 220010

#### SECTION 220030: INSULATION & COVERING – PLUMBING

#### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

#### 1.2 DESCRIPTION OF WORK

- A. This section includes insulation and covering furnished and installed on the following piping systems and equipment:
  - 1. Domestic cold water.
  - 2. Domestic hot water supply and return
  - 3. Condensate waste piping from air conditioning units.
  - 4. Exposed waste, trap and wall supplies at all handicap lavatories.

#### 1.3 REFERENCE STANDARDS

- A. Refer to Section 220000 for a general description of requirements applying to this section.
- B. Materials shall conform to the requirements of the NFPA Code.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 220010 for a general description of requirements applying to this section.
- 1.5 SUBMITTALS
  - A. Submit shop drawings and product data in accordance with Section 220000.
  - B. Submit the following:
    - 1. Product data on all insulation and covering.
- 1.6 WARRANTY/GUARANTEE
  - A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

## PART 2 – PRODUCTS

- 2.1 PIPE INSULATION MATERIAL
  - A. Fiberglass:

## **INSULATION & COVERING – PLUMBING**

- 1. Material: Preformed fiberglass bonded with resins to form circular pipe sleeves with factory applied, white all-service jacket bonded to reinforced foil vapor barrier jacketing. The jacket shall have factory-applied double pressure-sensitive adhesive closure and vapor sealing of longitudinal joints. Thermal Conductivity: .25 per inch at 100 degrees F. Flame spread of 25 and developed smoke of 50 or less.
- 2. All Valves and Fittings:
  - a. Class fiber insert and premolded PVC cover, Manville "Zeston" and "Hi-Lo Temp Inserts" for valves and fittings.
  - b. Factory molded fibrous glass fitting covering for fittings.
  - c. Mitered sections of pipe covering for valves.
- 3. Manufacturers: Johns-Manville, Certain-Teed, Owens-Corning.
- B. Closed Cell:
  - 1. Material: Flexible elastomeric foamed plastic closed cell structure insulation 25/50 rated with a flame spread rating of 25 or less and a smoke developed rating of 50 or less.
  - 2. Flexible pipe insulation shall be a foamed plastic closed cell structure material, with a thermal conductivity of not more than 0.27 Btu/Hr./Sq. Ft./Inch at a mean temperature of 75 degrees F. The insulation shall have an average density of at least 2 pounds per cubic foot, shall be self-extinguishing, and shall have a water vapor transmission rating of not more than 0.1 perms. Between temperature limits of -40 degrees F and plus 220 degrees F, the insulation shall not indicate any deviation from its original state.
  - 3. Manufacturers: Armacel, Insul-Tube, Nomaco Insulation.
  - 4. Specification Compliance: (Latest accepted Standards and Codes)

Insulation thickness for domestic hot and recirculation mains. IECC 804.5: ASTM-E-84 Flame spread and smoke developed. Standard method of test of surface burning of building materials. NFPA 255: ASTM C177: Thermal conductivity. Flame & smoke rating NFPA 90A, 90B: ASTM-C-534 Type 1 Tubular Grade, Self-Sealing Factory made air ducts and air connectors. (Armacell UL181 has to do with UL 181 mold growth) Test for surface burning characteristics of building materials. UL723 ASTM G21/C1338: Fungi resistance ASTM G2: **Bacterial Resistance** ASTM D1056, 2B1: Standard spec for flexible cellular materials. MIL-P-15280J, FORMT MIL-C-3133B (MIL STD 670B) Grade SBE-3 MEA 96-85M

- C. Covering of Pipe Insulation Outdoors:
  - 1. Wrapping: Wrap insulation with embossed .016" aluminum jacket.
  - 2. Fastenings: Cover shall be held in place with soft aluminum bands on 12" centers.
  - 3. Valves and Fittings: Weatherproof all valves and fittings.
  - 4. Manufacturers: Johns-Manville, Certain-Teed, Owens-Corning, Knauf.
- D. Protective cover for foam insulation in wet areas indoors:
  - 1. PVC heavy duty fitting covers and jacketing for kitchen wet areas.
  - 2. Fitting covers shall be glossy white, high impact, UV resistant PVC.
  - 3. Operating Temperature Limit: Up to 150°F.
  - 4. Flame Spread: 25 or less.
  - 5. Smoke Developed: 50 or less.
  - 6. Grade: Weatherable.
  - 7. Color: White
  - 8. Finish: Gloss
  - 9. Fitting covers and jacketing shall be "Zeston" 300 Series PVC, heavy duty covers and "Zeston" PVC jacketing.

# PART 3 – EXECUTION

- 3.1 INSTALLATION
  - A. Do not install until systems have been tested and meet requirements.
  - B. Do not install until building is closed in.
  - C. Heavy work which may damage insulation shall have been completed in the vicinity of the insulation work.
  - D. All installations shall be made by skilled craftsmen regularly engaged in this type of work.
  - E. Insulation shall be continuous thru-wall, ceiling and floors.
  - F. Pipe and equipment to be clean and dry prior to insulating.
  - G. Install all insulation in strict conformance with manufacturer's instructions.
  - H. Where "Barrier-free" lavatory supplies and waste are covered with a protective covering or insulation, the insulation must be installed back to wall, flush with wall escutcheon. Escutcheon to be finished flush with wall and wall opening to be smaller than escutcheon plate through entire building.
  - I. Install pipe insulation by slitting tubular sections and applying onto piping or tubing. Alternately, whenever possible, slide unslit sections over the open ends of piping or tubing. All seams and butt joints shall be adhered and sealed using Armaflex 520 or 520 BLV Adhesive. If when using AP Armaflex SS, only the butt joints shall be adhered using Armaflex 520 or 520 BLV Adhesive, Armaflex HT 625 Adhesive shall be used with HT Armaflex.

- J. Insulation shall be pushed onto the pipe, never pulled. Stretching of insulation may result in open seams and joints.
- K. Tape the ends of the copper tubing before slipping the Armaflex insulation over the new pipes to prevent dust from entering the pipe.
- L. All edges shall be clean cut. Rough or jagged edges of the insulation shall not be permitted. Proper tools such as sharp, non-serrated knives must be used.
- M. On cold piping, insulation shall be adhered directly to the piping at the high end of the run using a two-inch strip of Armaflex 520 or 520 BLV Adhesive on the ID of the insulation and on the pipe. All exposed end cuts of the insulation shall be coated with Armaflex 520 or 520 BLV Adhesive. All penetrations through the insulation and termination points must be adhered to the substrate to prevent condensation migration.
- N. Sheet insulation shall be used on all pipes larger than 6" IPS. Insulation shall not be stretched around the pipe. On pipes larger than 12" IPS, adhere insulation directly to the pipe on the lower 1/3 of the pipe.
- O. Seams shall be staggered when applying multiple layers of insulation.
- 3.2 VALVES, FLANGES AND FITTINGS:
  - A. All fittings shall be insulated with the same insulation thickness as the adjacent piping. All seams and mitered joints shall be adhered with Armaflex 520 or 520 BLV Adhesive. Screwed fittings shall be sleeved and adhered with a minimum 1" overlap onto the adjacent insulation. Armaflex HT 625 Adhesive shall be used with HT Armaflex.
  - B. Valves, flanges, strainers and Victaulic couplings shall be insulated using Armaflex donuts that shall then be covered with sheet or oversized tubular insulation.

# 3.3 HANGERS

- A. Support piping system using high density inserts with sufficient compressive strength. The pipe support insulation shall be elastomeric foam with the same or greater thickness than the pipe insulation. All joints shall be sealed with Armaflex 520 or 520 BLV adhesive.
- B. Standard and split hangers: Piping supported by ring hangers shall have hangers insulated with the same insulation thickness as the adjacent pipe. All seams and butt joints shall be sealed with Armaflex 520 or 520 BLV Adhesive. Armaflex HT 625 Adhesive shall be used with HT Armaflex. Ring hangers may be sleeved using oversized tubular insulation. On cold piping, insulation shall extend up the hanger rod a distance equal to four times the insulation thickness. Insulation tape may be used to a thickness equal to the adjacent insulation thickness.
- C. Clevis Hangers or other pipe support systems: Saddles shall be installed under all insulated lines at unistrut clamps, clevis hangers or locations where the insulation may be compressed due to the weight of the pipe. All piping shall have wooden dowels or blocks of a thickness equal to the insulation inserted and adhered to the insulation between the pipe and the saddle.

It is highly recommended for continuous insulation protection to use hanger sizes equal to the outer diameter of the pipe plus insulation thickness

- D. Armafix IPH o Armafix NPH can be used to prevent compression of insulation at standard split, clevis hangers or other pipe support systems. To minimize the movement of Armafix, it is recommended that a pair of non-skid pads be adhered to the clamps. In addition, to prevent loosening of the clamps, use of an antivibratory fastener, such as a nylon-locking nut, is also recommended.
- 3.3 PIPE COVERING (FOAMED PLASTIC TYPE)
  - A. All joints and seams shall be sealed with a compatible adhesive. Approved adhesives are as follows:

ArmacelNo. 520 (Low VOC use 520 BLVBenjamin Foster CompanyNo. 85-75 up to 200 degrees F.

Contractor may use self-sealing insulation in lieu of above.

B. Fitting covers shall be fabricated from the foamed plastic pipe insulation or from sheet insulation of the identical material. The fabrication shall be in accordance with manufacturer's instructions, and all seams mitered joints shall be joined using the adhesives described.

# 3.4 PIPE INSULATION – TYPES & THICKNESSES

A. Flexible Closed Cell:

| Piping System                   | Up to 3" | Over 3" to 6" | Over 6" |
|---------------------------------|----------|---------------|---------|
|                                 |          |               |         |
| Cold Water                      | 1/2"     | 1⁄2"          | 3⁄4"    |
| Hot Water (120°)                | 1"       | 1"            | 1-1/2"  |
| Hot Water Return (120°)         | 1"       | 1"            | 1-1/2"  |
| Hot Water (140°)                | 1"       | 1"            | 1-1/2"  |
| Hot Water Return (140°)         | 1"       | 1"            | 1-1/2"  |
| Condensate Waste                | 1/2"     | 1/2"          | -       |
| Handicap Lav Waste & Water      | 1/2"     |               |         |
| Soil/Waste Piping Above Ceiling | 1/2"     | 1⁄2"          | 3⁄4"    |

### B. Fiberglass:

| Piping System                   | Up to 3" | Over 3" to 6" | Over 6" |
|---------------------------------|----------|---------------|---------|
| Cold Water                      | 1/2"     | 1/2"          | 3⁄4"    |
| Hot Water                       | 1"       | 1"            | 1-1/2"  |
| Hot Water Return                | 1"       | 1"            | 1-1/2"  |
| Hot Water                       | 1"       | 1"            | 1-1/2"  |
| Hot Water Return                | 1"       | 1"            | 1-1/2"  |
| Condensate Waste                | 1/2"     | 1/2"          |         |
| Soil/Waste Piping Above Ceiling | 1/2"     | 1⁄2"          | 3⁄4"    |

### SECTION 220110: DRAINAGE SYSTEMS – PLUMBING

#### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this Section.

#### 1.2 DESCRIPTION OF WORK

- A. This section includes:
  - 1. Soil and waste piping system work as indicated on drawings and schedules, and by requirements of this section.
  - 2. Applications for soil and waste piping systems include the following:
    - a. Above ground soil, waste and vent piping within buildings including soil stacks, vent stacks, horizontal branches, traps and connections to fixtures and drains.
    - b. Underground building drain piping including mains, branches, traps, connections to fixtures and drains, and connections to stacks, extension from the building, terminating at connection to site sewer.
  - 3. Storm water drainage piping as indicated on drawings and by requirements of this section.
  - 4. Applications for storm water drainage piping include the following:
    - a. Roof drains and connections to gutters, with rain water conductors and connections to underground building storm drains.
    - b. Underground building storm drains, extending and connecting to site drainage system.
  - 5. Insulation for soil and waste and storm water drainage as specified in Section 220030 is included as work of this section.
  - 6. Trenching and backfilling required in conjunction with underground building drainage and site drainage piping as specified in Section 220000 is included as work of this section. Refer to Division I.
  - 7. Installation of detectable metallic underground tape for <u>all</u> exterior buried PVC drainage piping.

### 1.3 REFERENCE STANDARDS

A. Refer to Section 220000 for a general description of requirements applying to this section.

### 1.4 QUALITY ASSURANCE

- A. Refer to Section 220010 for a general description of requirements applying to this section, and a listing of all applicable codes.
- 1.5 SUBMITTALS
  - A. Submit shop drawings and product data in accordance with Section 220000.
  - B. Submit the following:
    - 1. Product data on all systems equipment.
  - C. See requirements for submission of cross referencing information.
- 1.6 WARRANTY/GUARANTEE
  - A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

### PART 2 – PRODUCTS

- 2.1 PIPING UNDERGROUND
  - A. Interior:
    - 1. Sanitary, storm water and condensate waste drainage piping within the building and extending beyond the building wall, unless otherwise noted on the plans shall be an option selection of a, b, or c below:
      - a. Service weight hub and spigot pattern cast iron soil pipe and fittings with neoprene gaskets.
      - b. Hubless cast iron soil pipe and fittings with cast iron coupling clamps and gaskets or heavy duty 3.04-.016" thick stainless steel bands..

# 2.2 PIPING ABOVE GROUND

- A. All above ground storm water, condensate, soil, waste and vent piping shall be:
  - 1. Hubless cast iron soil pipe with cast iron drainage fittings, couplings and stainless steel clamp bands for piping 2" and larger.
  - 2. Copper tubing, type DWV with wrought copper solder type drainage fitting for piping smaller than 2" in size.
- 2.3 SYSTEMS EQUIPMENT
  - A. Refer to Plumbing Fixture and Equipment Schedule for type, number, size and manufacturer of all drainage equipment and accessories.

# **DRAINAGE SYSTEMS – PLUMBING**

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering drainage equipment which may be incorporated in the work are limited to the following:

Floor Drains (all types)

Zurn Josam Wade Watts Smith MIFAB

<u>Cleanouts</u>

Zurn Josam Wade Watts Smith MIFAB

- C. Cross Reference Identification:
  - 1. If the Contractor selects a manufacturer of drainage equipment products other than as identified on the Schedule but is selected from the available manufacturers listed above, a cover sheet shall be included with the submission of shop drawings indicating the cross referenced manufacturer and model number.
  - 2. Shop drawings shall not be reviewed or accepted if not in compliance with this requirement.

# PART 3 – EXECUTION

# 3.1 INSTALLATION OF SOIL AND WASTE PIPING

- A. The Plumbing Contractor shall install a complete system of sanitary drainage piping as shown on the drawings. All drainage lines shall be properly run, trapped and vented in accordance with the local Plumbing Code and all dry vents, back vents, loop vents, revents or special vents required by the Code shall be furnished and installed by the Plumbing Contractor.
- B. Drainage lines of the sizes shown on the drawings shall be extended within the building with branches connecting to the base of all soil, waste and vent stack, etc., leaving outlets for connection to all fixtures, floor drains, as required.
- C. All changes in direction of drainage piping shall be installed with "Y" branches and 1/8 bends. All stacks shall be supported with concealed pipe clamps or hangers as required and the openings in the roof for the vent pipes will be provided by this Contractor.

- D. All drainage piping which will be located above suspended ceilings shall be checked for slope to assure positive drainage, prior to installation of the ceilings. Pressure tests for leaks, as hereinafter specified, shall also be performed prior to ceiling installation.
- E. Install soil and vent piping pitched to drain at minimum slope of 1/4" per foot (2%) for piping 3" and smaller, and 1/8" per foot (1%) for piping 4" and larger.
- F. Vertical to horizontal change in direction to be made with long radius fittings.
- G. Support all soil and waste piping per IPC Section 308.5, 308.6 and 308.7.

# 3.2 INSTALLATION OF CLEANOUTS

- A. Cleanouts: Install in sanitary piping and storm conductor and building drain piping as indicated, and/or as required by New Castle County Plumbing Code; at each change in direction of piping greater than 45 degrees; at minimum intervals of 100' for all size straight run piping; and at base of each conductor. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish.
- B. Exterior cleanouts shall be installed with access covers flush to grade. The cleanout shall be installed within a concrete pad, 18"x18"x6" thick.
- 3.4 INSTALLATION OF FLOOR DRAINS (ALL TYPES)
  - A. Install floor drains in accordance with manufacturer's written instructions and in locations indicated.
  - B. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
  - C. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
  - D. Position drains so that they are accessible and easy to maintain.
  - E. <u>All</u> floor drains shall be provided with trap primer connections. <u>All</u> floor drains shall have a trap primer discharge line connected to the outlet.
  - F. All exposed drainage piping shall be DWV copper pipe and fittings. All piping shall be rigidly supported off the wall with split ring clamps or uni-strut.
- 3.5 INSPECTION
  - A. The Plumbing Contractor shall, upon completion of the drainage systems, secure from the Inspector and/or the Municipality under which the installation was made and inspected, certificates or letters of approval indicating the system has been installed satisfactorily. The Plumbing Contractor shall certify that all inspection fees, permits and charges have been duly paid.

### END OF SECTION 220110

### **DRAINAGE SYSTEMS – PLUMBING**

### SECTION 220120: DOMESTIC WATER SYSTEMS - PLUMBING

#### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this Section.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes:
    - 1. Domestic water piping systems work is indicated on drawings and schedules and by requirements of this section.
  - B. Applications for water piping systems include the following:
    - 1. Domestic cold-water piping.
    - 2. Domestic hot-water piping.
    - 3. Domestic recirculating-water piping.
  - C. Complete flow balancing of the entire domestic hot water return system.
  - D. Insulation for domestic water piping as specified in Section 220030 is included as work of this section.
  - E. Trenching and backfill required in conjunction with exterior water piping as specified in Section 220000 is included as work of this section. Refer to Division 1.
- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 220000 for a general description of requirements applying to this section.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 220010 for a general description of requirements applying to this section.
- 1.5 SUBMITTALS
  - A. Submit shop drawings and product data in accordance with Section 220000.
  - B. Submit the following:
    - 1. Product data on all specialties and systems equipment.

### 1.6 WARRANTY/GUARANTEE

A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

# PART 2 – PRODUCTS

# 2.1 DOMESTIC WATER PIPING MATERIALS AND PRODUCTS

A. Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in domestic water piping systems. Where more than 1 type of materials or products are indicated, selection is Installer's option.

### 2.2 BASIC PIPE, TUBE AND FITTINGS

- A. Provide pipe, tube, and fittings complying with Division 22 Basic Materials and Methods section "Pipe, Tube, and Fittings", in accordance with the following listing:
- B. Interior Domestic Water Piping:

| Tube Size 4" and Smaller: | Copper tube.                   |
|---------------------------|--------------------------------|
| Wall Thickness:           | Type "L" hard-drawn temper.    |
| Fittings:                 | Wrought-copper, solder-joints. |

### 2.3 BASIC PIPING SPECIALTIES

A. Provide piping specialties complying with Section 220010 Basic Materials and Methods in accordance with the following listing:

Pipe escutcheons Dielectric unions Drip pans Pipe sleeves Sleeve seals

# 2.4 SPECIAL PIPING SPECIALTIES

A. Water Hammer Arresters: Provide bellows or piston type water hammer arresters, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201.

### 2.5 BASIC VALVES

A. Provide valves complying with applicable Division 22 sections "Valves", in accordance with the following listing:

# **DOMESTIC WATER SYSTEMS – PLUMBING**

| B. | Sectional Valves:<br>2-1/2" and Smaller: | Ball Valves.<br>Gate Valves.  |
|----|--|---|
|    | 3" and Larger:                           | Ball Valves.<br>Butterfly Valves.   |
| C. | Shutoff Valves:<br>2-1/2" and Smaller:   | Ball Valves.<br>Gate Valves   |
|    | 3" and Larger:                           | Ball Valves.<br>Butterfly Valves.   |
| D. | <u>Drain Valves:</u><br>All              | Hose End Threaded Gate or Ball Valves.  |
| E. | Balancing Valves:<br>2" and Smaller:     | Ball Valves (Circuit Setter Type).<br>(w/ Memory Stop)                                      |
| F. | Check Valves:<br>All Sizes:              | Swing Check Valves. Horizontal Installations<br>Spring Check Valves. Vertical Installations |

# 2.6 SPECIAL VALVES

- A. Special valves required for domestic water piping systems include the following types:
- B. Hose Bibbs: Threaded end, renewable composition disc, tee handle, 3/4" NPT inlet, 3/4" hose outlet with vacuum breaker.
  - 1. Finished Areas: Chrome plated.
  - 2. Unfinished Areas: Bronze finish.

# 2.7 BASIC THERMOMETERS AND GAUGES

A. Provide thermometers and gauges complying with Division 22 Basic Materials and Methods Section "Meters and Gauges", in accordance with the following listing:

Pressure gauges Glass thermometers Pressure and temperature connections

### 2.8 BACKFLOW PREVENTERS

A. Provide, of the type indicated on the drawing schedule, reduced pressure principal type, blackflow preventers shall consist of an assembly including shutoff valves on inlet and outlet, and strainer on

# **DOMESTIC WATER SYSTEMS – PLUMBING**

inlet. Backflow preventers shall include test cocks, and pressure-differential relief valve located between two positive seating check valves. Construct in accordance with ASSE Standard.

### 2.9 SYSTEMS EQUIPMENT MANUFACTURERS

- A. Refer to Plumbing Fixture and Equipment Schedule for type, number, size and manufacturer of all equipment and accessories.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering equipment which may be incorporated in the work are limited to the following:

Shock Absorbers: Zurn Josam Wade Watts Smith PPP Inc. **MIFAB** Automatic Trap Primers PPP Inc. Sloan Sioux Chief MIFAB Hose Bibbs Nibco Tanner Central Brass Wolverine **Backflow Preventers** Conbraco Febco Cla-Val Wilkins ITT Grinnell Neptune Watts Relief Valves Rockwell Fisher DeZurik Pressure Reducing Valves Conbraco Jamesbury

DeZurik Fisher ITT Bell & Gossett

### PART 3 – EXECUTION

# 3.1 INSTALLATION OF BASIC IDENTIFICATION

- A. Install mechanical identification in accordance with Section 220010 Basic Materials and Methods.
- B. Support vertical piping at floor levels using approved riser clamps. Clamp material shall be compatible with pipe material. Maximum vertical spacing shall be 10'-0". Domestic water piping shall be supported in accordance with the International Mechanical Code, Section 305 and Table 305.4 Spacing Intervals, or in accordance with MSS-SP-69. International Plumbing Code's latest edition, Section 308.5, accept as follows:
  - 1. Copper tubing  $\frac{1}{2}$ " to 1-1/4" nominal size, not to exceed 6 ft. horizontal intervals.
  - 2. Copper tubing 1-1/2" and larger nominal size, not to exceed 10 ft. horizontal intervals.
  - 3. Copper tubing  $\frac{1}{2}$ " to  $1-\frac{1}{4}$ " nominal size, not to exceed 10 ft. vertical intervals.
  - 4. Copper tubing 1-1/2" and larger nominal size not to exceed 10 ft. vertical intervals.
  - 5. CPVC pipe or tubing <sup>1</sup>/<sub>4</sub>" to 1" nominal size, not to exceed 3 ft. horizontal spacing.
  - 6. CPVC pipe or tubing 1-1/4" and larger nominal size not to exceed 4 ft. horizontal spacing.
  - 7. CPVC pipe or tubing  $\frac{1}{4}$ " to 1" nominal size not to exceed 10 ft. vertical.
  - 8. CPVC pipe or tubing 1-1/4" and larger nominal size not to exceed 10 ft. vertical." \*Mid-Story Guide.

# 3.2 INSTALLATION OF PIPING SPECIALTIES

- A. Install piping specialties in accordance with Section 220010 Basic Materials and Methods.
- B. Water Hammer Arresters: Install in upright position, in locations and of sizes in accordance with PDI Standard WH-201, and elsewhere as indicated.

### 3.3 INSTALLATION OF VALVES

- A. Install valves in accordance with Division 22 Basic Materials and Methods section, "Valves".
- B. Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves 2 or more fixtures, equipment connections, and elsewhere as indicated.
- C. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
- D. Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain domestic water piping system.
- E. Check Valves: Install on discharge side of each pump, and elsewhere as indicated.

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- F. Balance Cocks: Install in main recirculating loop and in each branch hot water recirculating loop. Install a ball valve and check valve at each balance valve installation.
- G. Hose Bibbs: Install on exposed piping where indicated, with vacuum breaker.
- 3.4 INSTALLATION OF BACKFLOW PREVENTERS
- A. Install backflow preventers where indicated, and where required by International Plumbing Code. Locate in same room or area as equipment being protected.
- B. RPZ type backflow preventers to be piped from the relief outlet to nearest floor drain.
- C. A check valve is required on the upstream side of all RPZ installations.
- 3.5 INSTALLATION OF PRESSURE REGULATING VALVES
  - A. Install pressure regulating valves where indicated. Provide inlet and outlet shutoff valves, and ball valve bypass. Provide pressure gauge on valve outlet.
- 3.6 INSTALLATION OF THERMOMETERS AND GAUGES
  - A. Install thermometers and gauges in accordance with Section 220010 Basic Materials and Methods.
- 3.7 EQUIPMENT CONNECTIONS
  - A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by International Plumbing Code.
  - B. Equipment furnished by the Owner or Contractors other than this Contractor: After equipment has been set in place, this Contractor shall furnish all labor and material required to make final connections, between roughing-in and the equipment. Install valves, fittings, trim and appurtenances furnished with the equipment. All exposed piping in the kitchen areas shall be chrome plated. Piping in other areas shall be of the same material as the system to which it connects.
- 3.8 AUTOMATIC TRAP PRIMERS
  - A. Install units in accordance with manufacturer's written instructions.
  - B. Cap-off all unused tube connections not to be used for discharge procedures.
  - C. Units installed in Mechanical Room shall be surface mounted. All others shall be arranged for recessed installation and shall include a 14"x16" access door #D-1416SS.
  - D. All discharge tubing from the tube connectors to the floor drain connection shall be minimum Type "M" copper for above floor slab installations. Where discharge piping runs below the floor slab, the piping may be PVC grade water piping. Ensure that all connections are properly made and leak-free.
  - E. Verify all electrical connections prior to the start-up of the units.

F. Shield copper from direct contact with concrete, stone and sharp edges below slab.

# 3.9 SPARE PARTS

A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

# 3.10 DOMESTIC HOT WATER RETURN

- A. This Contractor shall install complete and operating hot water return system. The system shall be balanced and include a report as required in HVAC Specification Section 230950.
- B. Balancing Valves are required in the system as hereinbefore specified. The system shall also include the installation of "air bleed" or "burp" valves to remove any trapped air in the system.
- C. Where emergency showers are installed with thermostatic mixing valve, they shall require the installation of a hot water return line as detailed on the drawings.

# END OF SECTION 220120

### SECTION 220130: GAS PIPING SYSTEMS – PLUMBING

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this Section.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes:
    - 1. Natural gas piping system as indicated on drawings and schedules, and by requirements of this section.
    - 2. Applications for propane gas piping systems include the following:
      - a. All gas piping from the exterior secondary regulator assembly location to all equipment and outlets, requiring gas service.
- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 220000 for a general description of requirements applying to this Section.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 220010 for a general description of requirements applying to this section.
- 1.5 SUBMITTALS
  - A. Submit shop drawings and product data in accordance with Section 220000.
  - B. Submit the following:
    - 1. Product data on gas valves.
- 1.6 WARRANTY/GUARANTEE
  - A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

# PART 2 – PRODUCTS

### 2.1 NATURAL GAS PIPING MATERIALS AND PRODUCTS

A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to

# GAS PIPING SYSTEMS – PLUMBING

comply with installation requirements. Provide materials and products complying with ANSI B31.2 where applicable, base pressure rating on natural gas piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match piping materials used in natural gas piping systems. Where more than 1 type of material or product is indicated, selection is Installer's option.

# 2.2 BASIC IDENTIFICATION

A. Provide identification complying with Division 22 Sections and in accordance with the following listing:

Building Distribution Piping: Plastic pipe markers.

Gas Service: Underground type plastic line markers with detectable wire..

Gas Valves: Plastic valve tags.

- 2.3 BASIC PIPE, TUBE AND FITTINGS
  - A. Provide pipe, tube and fittings complying with Section 220010 Basic Materials and Methods -Plumbing and in accordance with the following listing:
    - 1. Interior Piping: Schedule 40 black steel ASTM A-53, A-106

Fittings: Malleable black iron, threaded

# 2.4 BASIC PIPING SPECIALTIES

A. Provide piping specialties complying with applicable Division 22 Sections and in accordance with the following listing:
 Pipe escutcheons
 Pipe sleeves
 Sleeve seals

### 2.5 SPECIAL VALVES

A. Valves required for gas piping systems on this project shall be the following types:

Gas Valves: (Up to 3")

- Apollo 80-100 Series bronze gas ball valve. Threaded, 600 PSIG WOG, cold non-shock. 250 PSIG LP-Gas. 150 PSIG saturated steam. Vacuum service to 29 inches Hg. Federal Specification: WW-V-35C, Type: II, Composition: BZ, Style: 3.
- 2. Features:
  - UL Listed for LP-Gas and natural gas.
  - Large ports to reduce pressure drop
  - Reinforced TFE seats and seals
  - Blow-out-proof stem design

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- Optional tee handle available
- Quarter turn on-off
- Adjustable packing gland
- One piece bronze body
- Chromium plated ball
- 3. UL Listings:
  - Guide YSDT: LP-Gas shut-off valve.
  - Guide YRPV: Gas shut-off valve for use with natural and manufactured gases.
- 4. This valve shall be used for all pipe sizes up to 3" in the system.
- B. Manufacturers: Subject to compliance with requirements, provide gas valves of one of the following:

Apollo/Conbraco Stockham Milwaukee NIBCO, Inc. Watts

### PART 3 - EXECUTION

- 3.1 INSTALLATION OF BASIC IDENTIFICATION
  - A. Install mechanical identification in accordance with applicable Division 22 Sections.
- 3.2 INSTALLATION OF NATURAL GAS PIPING (INTERIOR)
  - A. Install natural gas distribution piping in accordance with Section 220010 Basic Materials and Methods - Plumbing and in accordance with applicable codes IFGC latest edition, and local Utility Company requirements.
  - B. Use sealants on metal gas piping threads which are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.
  - C. Remove cutting and threading burrs before assembling piping.
  - D. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped or damaged.
  - E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping or equipment connections are completed.
  - F. Install drip-legs in gas piping where indicated, and where required by code or regulation.
  - G. Install "Tee" fitting with bottom outlet plugged or capped at bottom of pipe risers.
  - H. Use dielectric unions where dissimilar metals are joined together.

- I. Install piping with 1" drop in 60' pipe run (0.14%) in direction of flow.
- J. Install piping parallel to other piping, but maintain minimum of 12" clearance between gas piping and steam or hot water piping above 200 degrees F (93 degrees C).
- K. For piping buried in building substrate, or below floor slabs, install in welded conduit, ventilated to outdoors on both ends, and tested to same requirements as gas piping.
- L. Gas valves shall not be installed above ceilings without access and signage.

### M. Supports:

- 1. All pipe, fittings, valves, installation and testing shall be in accordance with the IFGC, Chapter 4.
- 2. Gas piping shall be supported in accordance with the International Fuel Gas Code's latest accepted 2003 Edition, Section 407, as follows:
- 3. Support intervals shall be in accordance with the IFGC listed above and in Section 415, Table 415.1 as follows:
  - a. Steel pipe  $\frac{1}{2}$ " nominal size not to exceed 6 ft.
  - b. Steel pipe <sup>3</sup>/<sub>4</sub>" to 1" nominal size not to exceed 8 ft.
  - c. Steel pipe 1-1/4" and larger nominal size horizontal not to exceed 10 ft.
  - d. Steel pipe 1-1/4" and larger nominal size, vertical not to exceed every floor.
- 4. Support and spacing of CSST Systems shall be in accordance with CSST manufacturer's instructions.

### 3.3 INSTALLATION OF VALVES

- A. Gas valves: Provide at connection to gas train for each gas-fired equipment item; and on risers and branches where indicated.
- B. Locate gas valves where easily accessible, and where protected from possible damage.
- 3.4 EQUIPMENT CONNECTIONS
  - A. Connect gas piping to each gas-fired equipment item, with drip leg, union and shutoff gas valve. Comply with equipment manufacturer's instructions. Drip legs shall not be installed on any exterior gas piping.
  - B. Equipment furnished by the Owner, or Contractors other than this Contractor: After equipment has been set in place, this Contractor shall furnish all labor and material required to make final connections between roughing-in and the equipment. Install valves, fittings, trim and appurtenances furnished with the equipment. Piping shall be of the same material as the system to which it connects.

# END OF SECTION 220130

### **SECTION 220140: FIXTURES – PLUMBING**

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes:
    - 1. Plumbing fixtures and trim work as indicated by drawings and schedules, and by requirements of this section.
    - 2. Types of plumbing fixtures required for the project include the following:

Lavatories Countertop Sinks Service Sinks Handicap Lavatory Insulation

- 3. Refer to Section 220120 for domestic water piping systems used in conjunction with plumbing fixtures; not work of this section.
- 4. Refer to Section 220110 for soil and waste piping systems used in conjunction with plumbing fixtures; not work of this section.
- 5. Refer to Division 26 sections for electrical connections to water coolers and other plumbing fixtures; not work of this section.

#### 1.3 REFERENCE STANDARDS

A. Refer to Section 220000 for a general description of requirements applying to this section.

# 1.4 QUALITY ASSURANCE

- A. Refer to Section 220010 for a general description of requirements applying to this section.
- B. Manufacturers: Firms regularly engaged in manufacture of plumbing fixtures of the type, style and configuration required, whose products have been in satisfactory use in similar service for not less than 3 years.
- C. Plumbing Fixture Standards: Comply with applicable portions of New Castle County Plumbing Code pertaining to materials and installation of plumbing fixtures.
- D. ANSI Standards: Comply with applicable ANSI standards pertaining to plumbing fixtures and systems.

#### FIXTURES – PLUMBING

- E. PDI Compliance: Comply with standards established by Plumbing and Drainage Institute pertaining to plumbing fixture supports.
- F. Federal Standards: Comply with applicable FS WW-P-541/- Series sections pertaining to plumbing fixtures.
- G. UL Labels: Provide water coolers which have been listed and labeled by Underwriters' Laboratories.
- H. ARI Labels: Provide water coolers which are rated and certified in accordance with applicable Air-Conditioning and Refrigeration Institute Standards.

# 1.5 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 220000.
- B. Submit the following:
  - 1. Product Data: Submit manufacturer's specifications for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished, roughing-in dimensioned drawings, templates for cutting substrates, fixture carriers, and installation instructions.
  - 2. Color Selection Data: Submit charts or samples for color selection where applicable.
  - 3. Maintenance Data: Submit maintenance data and parts lists for each fixture type and trim item, including instructions for care of finishes. Include this data in maintenance manual.

### 1.6 WARRANTY/GUARANTEE

- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.
- 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING
  - A. Deliver plumbing fixtures individually wrapped in factory-fabricated containers.
  - B. Handle plumbing fixtures carefully to prevent breakage, chipping and scoring the fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

# PART 2 – PRODUCTS

- 2.1 PLUMBING FIXTURES
  - A. Provide factory-fabricated fixtures of type, style and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer and as required for a complete installation. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

# 2.2 MATERIALS

- A. Unless otherwise specified, comply with applicable Federal Specification WW-P-541/-Series sections pertaining to plumbing fixtures, fittings, trim, metals and finishes. Comply with the requirements of WW-P-541/-specification relative to quality of ware, glazing, enamel, composition and finish of metals, air gaps, and vacuum breakers, even though some plumbing fixtures specified in this section are not described in WW-P-541/-.
- B. Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, decoloration, or other surface imperfections on finished units are not acceptable.
- C. Where fittings, trim and accessories are exposed or semi-exposed, provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.
- D. Stainless Steel Sheets: ANSI/ASTM A-167, Type 302/304, hardest workable temper. Finish: No. 4, bright, directional polish on exposed surfaces.
- 2.3 PLUMBING FITTINGS, TRIM AND ACCESSORIES
  - A. Water Outlets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valves, or dispensing devices, of type and size indicated, and as required to operate as indicated. Include manual shutoff valves and connecting system pipes to permit outlet servicing without shut- down of water supply piping systems.
    - 1. Vacuum Breakers: Provide with flush valves where required by governing regulations, including locations where water outlets are equipped for hose attachment.
  - B. P-traps: Include removable P-traps where drains are indicated for direct connection to drainage system. All traps shall be minimum 17 gauge.
  - C. Carriers: Provide cast-iron and/or steel supports for fixtures. Carriers shall be provided for all wallhung fixtures, and/or the carrier shall be selected to support the fixture independently of the wall. Carriers shall be adjustable type, complete with all fittings and foot supports. Carrier shall be single or double, back-to-back, horizontal offset and vertical stack type. Carrier shall be selected and used as best suited within the pipe chases. Where noted or indicated, stud mount type carriers shall be used and installed within stud wall s 8" and less.
  - D. Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations, provide chrome plated sheet steel escutcheons with friction clips.
  - E. Aerators: Provide aerators of types approved by Health Departments having jurisdiction.
  - F. Comply with additional fixture requirements contained in fixture schedule attached to this section.
- 2.4 FIXTURE LIST
  - A. Refer to the "Plumbing Fixture & Equipment Schedule" as indicated on the drawings.

#### 2.5 AVAILABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering fixtures, trim and carriers which may be incorporated in the work include, and are limited to the following:

Faucets/Trim (Non-Sensor Operated) Kohler American Standard Delta Moen Elkay Speakman Chicago <u>Wall Supplies/Traps</u> McGuire Brass-Craft Kohler

American Standard Sanitary-Dash Teledyne Wolverine Pro-Flo Keeny

Fixture Carriers Zurn Josam Wade Watts Smith MIFAB

<u>Stainless Steel Sinks</u> Elkay Just Dayton Advanced-Tabco

Emergency/Safety Equipment Bradley Haws Western Speakman Guardian

- B. Cross Reference Identification:
  - 1. If the Contractor selects a manufacturer of drainage equipment products other than as identified on the Schedule but is selected from the available manufacturers listed above, a cover sheet shall be

included with the submission of shop drawings indicating the cross referenced manufacturer and model number.

2. Shop drawings shall not be reviewed or accepted if not in compliance with this requirement.

# 2.6 HANDICAP LAVATORY INSULATION

- A. Fully molded "P" trap and angle valve insulation kit Handi-Lav Guard Truebro Model #101, 102 and 105 to suit.
- B. Insulation to meet A.D.A. #4.19.4, ANSI A117.1 and BOCA P- 1203.4.
- C. Self-extinguishing ASTM D635 burn characteristics, Thermal conductivity ASTM C177-K value 1.17.

### PART 3 – EXECUTION

### 3.1 FIXTURE CONNECTIONS

- A. Connections to plumbing fixtures shall be of the sizes indicated on the "Plumbing Fixture & Equipment Schedule".
- B. The sizes indicated on the Schedule are for drainage and water piping serving an individual fixture; the sizes of the mains and branches shall be as indicated on the drawings.

### 3.2 INSPECTION AND PREPARATION

- A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until satisfactory conditions have been corrected.
- B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and service intended purposes. Comply with applicable requirements of the New Castle County Plumbing Code pertaining to installation of plumbing fixtures.
- C. Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement.

# 3.3 CLEAN AND PROTECT

- A. Fixture shall be thoroughly cleaned after completion of installation.
- B. Protect installed fixtures from damage during the remainder of the construction period.

# 3.4 FIELD QUALITY CONTROL

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect/Engineer. Remove cracked or dented units and replace with new units.

END OF SECTION 220140

### **SECTION 220150: EQUIPMENT – PLUMBING**

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- 1.2 DESCRIPTION OF WORK
  - A. This section includes:
    - 1. Plumbing equipment as indicated on drawings and provisions of this section, including schedules and equipment lists associated with either drawings or this section.
- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 220000 for a general description of requirements applying to this section.
  - B. UL and NEMA Compliance: Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by Underwriters' Laboratories and comply with NEMA Standards.
  - C. NEC Compliance: Comply with National Electrical Code (ANSI/NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.
  - D. ASME Relief Valve Stamps: Provide water heaters with safety relief valves bearing ASME valve markings.
  - E. AWWA Compliance: Comply with applicable American Water Works Association Standards pertaining to steel water tanks.
  - F. CSA and NSF Labels: Provide water tanks which have been listed and labeled by CSA International and National Sanitation Foundation.
  - G. ASME Code Symbol Stamps: For the following equipment, comply with ASME Boiler & Pressure Vessel Code for construction and stamp with ASME Code Symbol:
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 220010 for a general description of requirements applying to this section.

### 1.5 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 220000.

- B. Submit the following:
  - 1. Product data on all equipment including roughing-in data.
  - 2. Connection diagrams for related piping and specialties.

# 1.6 WARRANTY/GUARANTEE

A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS

### PART 2 – PRODUCTS

- 2.1 EQUIPMENT
  - A. Refer to "Plumbing Fixture & Equipment Schedule" for type, numbers, size and manufacturer of all equipment accessories.

#### END OF SECTION 220150

### **SECTION 220190: TESTING – PLUMBING**

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the work specified in this Section.
- 1.2 DESCRIPTION OF WORK
  - A. Extent of plumbing systems to be tested is indicated on the drawings and by requirements of this section.
  - B. Applications of tests include the following:
    - 1. Interior Piping
      - a. Domestic cold, hot & hot water return piping
      - b. Gas piping
      - c. Sanitary and condensate waste drainage piping
  - C. See Fire Protection Specifications for testing of Fire Protection Systems.
- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 220000 for a general description of requirements applying to this section.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 220010 for a general description of requirements applying to this section.

#### 1.5 SUBMITTALS

- A. Submit test reports in accordance with Section 220000.
- 1.6 WARRANTY/GUARANTEE
- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

PART 2 – PRODUCTS

- 2.1 PIPE & FITTING REPLACEMENTS
- A. Refer to Section 220010 for replacement of any defective pipe or fittings. Replacement shall include all required uncovering, excavating, recovering and backfilling.

#### PART 3 – EXECUTION

#### 3.1 GENERAL

- A. All exterior or interior piping shall be tested and approved before backfilling or concealing. Failure to secure the approval of the Municipal Inspector, Utility Company's Inspector or the Inspector of the Architect/Engineer makes it mandatory for the Contractor to completely expose the piping for testing. All expense involved in the uncovering of the piping for the test and recovering shall be borne by the respective Contractor with no change in Contract.
- B. All equipment, material and labor required for testing a plumbing system or part thereof shall be furnished by the Plumbing Contractor responsible for installing the work.

#### 3.2 INTERIOR PIPING

#### A. Drainage Piping:

Rough Plumbing: The piping of all plumbing storm, condensate waste, sanitary drainage and venting systems shall be tested upon completion of the rough piping installation by water or air and proved watertight. Where required by the code official, the cleanout plugs shall be removed to ascertain if the pressure has reached all parts of the system. Either of the following methods shall be used:

1. Water Test: The water test shall be applied to the drainage system either in its entirety or in sections after rough piping has been installed. If applied to the entire system, all openings in the piping shall be closed, except the highest opening, and the system filled with water to the point of overflow. If the system is tested in sections, each opening shall be plugged except the highest opening of the section under test, and each section shall be filled with water, but a section shall not be tested with less than a 10-foot head of water.

In testing successive sections, at least the upper 10 feet of the next preceding section shall be tested, so that a joint or pipe in the building (except the uppermost 10 feet of the system) shall not have been subjected to a test of less than a 10-foot head of water. The water shall be kept in the system or in the portion under test for a minimum of 15 minutes before inspection starts. The system shall then be tight at all points.

2. Air Test: The air test shall be made by attaching an air compressor testing apparatus to an opening, and, after closing all other inlets and outlets to the system, forcing air into the system until there is a gauge pressure of 5 pounds per square inch (5 psi) or a minimum of 10-inch column of mercury. This pressure shall be held without introduction of additional air for a minimum period of 15 minutes.

<u>Precautionary Note:</u> The compressibility of air and/or other gases result in tremendous amounts of stored energy, even at lower pressures. Over-pressurizing creates a substantial hazard to personnel and property near the area should a failure occur. Consult with the Plastic Pipe Institute (PPI) for statements and alerts, along with State and local safety offices.

Finished Plumbing: Where required by the code official, after the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas and water-tight by one of the following test methods.

- The final test for gas and water-tightness of the completed drainage and vent systems shall be made by a smoke test or other approved method. The test shall be made by filling all traps with water, and then introducing into the system smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof, the stack openings shall be closed and a pressure equivalent to a 1" water column shall be built and maintained for the period of the inspection.
- 2. After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proven gas and water-tight by plugging the stack openings on the roof and building drain where the drain leaves the building and with air introduced into the system equal to the pressure of a 1-inch water column. This shall be accomplished by the use of a "U" tube or manometer inserted in the trap of a water closet. Such pressure shall remain constant for the period of inspection without the introduction of additional air.

Building sewer test: The building sewer shall be tested by insertion of a test plug at the point of connection with the public sewer or individual sewage disposal system. The building sewer shall then be filled with water under a head of not less than 10 feet. The water level at the top of the test head of water shall not drop for at least 15 minutes.

- B. Domestic Water Piping: All new, altered, extended or replaced interior water piping installed shall be tested at 100 psig maintaining the pressure for four hours with not more than 1% drop in pressure. The system shall be filled with water which shall remain in the system until the water and the piping are the same temperature. If water pipe testing is under the jurisdiction of the local inspector, his requirements shall be used; however, they shall be not less than specified herein. The tests shall be performed in the presence of the representative of the Architect/Engineer and to his satisfaction.
- C. Natural Gas Piping:
  - 1. All new, altered, extended or replaced interior natural gas piping installed shall be tested in accordance with the requirements of the National Fire Protection Association, latest edition of the IFGC, Section 107, and the requirements of the local Utility Company as applicable. In the absence of a specific test required by the Authorities, or if such requirements are less stringent than the test hereinafter specified, then the interior gas piping shall be tested as follows in the presence of the representative of the Architect.
  - 2. Before appliances are connected, piping shall be filled with air or nitrogen, to a pressure of 10 psi and proved tight with no drop in pressure for the length of time required to inspect the joints, but in no case less than 30 minutes. The source of pressure shall be isolated before the pressure tests are performed. Pressure shall be measured with a mercury manometer, or slope gauge or equivalent device so calibrated as to be read in increments of not greater than one-tenth pound. All piping which will be concealed shall be tested, prior to being closed in by construction.
- D. Compressed Air Piping: Compressed air piping shall be tested at 125 psi. The pressure shall be maintained on the system a minimum of 30 minutes without any loss in pressure. If a loss in pressure occurs, leakage shall be corrected and piping retested.

#### 3.3 EXTERIOR PIPING

- A. Sanitary & Storm Water Drainage Piping:
  - 1. All new exterior sanitary and storm water drainage installed shall be tested in a manner and in a sequence best suited to project. The test shall be performed in the presence of the Inspector of the Municipality under whose jurisdiction the installation is made and shall conform to his requirements.
  - 2. In the absence of a specific code test, the Contractor shall perform the following testing in the presence of the representatives of the Architect.
  - 3. Before any section of sanitary and storm water drainage has been backfilled more than 6 inches above the top of the pipes, exclusive of the joint area, the system shall be tested. Wherever possible, the section of the system shall be tested from manhole to manhole. The lower end of each section to be tested shall be plugged with a suitable device manufactured for this purpose. The section being tested shall be filled with water and the leakage observed and gauged.
  - 4. For the gravity sanitary drainage piping to be acceptable, the water leakage after filling shall not exceed 2 gallons per 24 hours per lineal foot of pipe joints with all joints under a constant pressure of not less than 0.1 pound.
  - 5. For the storm water to be acceptable, the water leakage after filling shall not exceed 3 gallons per 24 hours per lineal foot of pipe joints with all joints under a constant pressure of not less than 0.1 pound.

### 3.4 STERILIZATION

- A. After final testing for leaks, all new potable water piping installed including water service piping, shall be flushed to remove foreign material.
- B. Before placing domestic water systems in service, a qualified service organization shall be engaged, to sterilize the entire building including the exterior water service piping in accordance with the following procedure:
  - 1. Contractor shall provide a 3/4" hose connection somewhere in the main entering the building, or in the Mechanical Room and/or in the meter pit, pump in sufficient sodium hypochlorite to produce a free available chlorine residual of not less than 100 PPM.
  - 2. Proceed upstream from the point of chlorine application opening all faucets and taps until chlorine is detected. Close faucets and taps when chlorine is evident. Consult with the local code department for additional concentrations and durations.
  - 3. When chlorinated water has been brought to every faucet and tap with a minimum concentration of 200 PPM chlorine, retain this water in the system for at least three hours.
  - 4. At the end of the retention period, no less than 100 PPM of chlorine shall be present at the extreme end of the system.

- 5. Proceed to open all faucets and taps and thoroughly flush all new lines until the chlorine residual in the water is less than 1.0 PPM.
- 6. Obtain representative water samples from the system for analysis by a recognized Bacteriological Laboratory.
- 7. If all samples tested for impurities and organisms are negative, a letter and laboratory reports shall be submitted by the service organization to the contractor, certifying successful completion of the sterilization.
- 8. If any samples tested indicate the presence of harmful impurities and organisms, the entire sterilization procedure shall be repeated.
- 9. Plumbing Contractor shall provide plumbing connections and power for pumping chlorine solution into the system.
- C. Available Service Organizations: Subject to compliance with requirements, provide the sterilization service of one of the following:

Water Chem Arc Company, Inc. Nova Consultants Artesian Water Co.

END OF SECTION 220190

### **SECTION 220191: BALANCING – PLUMBING**

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the work specified in this Section.
- 1.2 DESCRIPTION OF WORK
  - A. Extent of plumbing systems to be balanced is indicated on the drawings and by requirements of this section.
  - B. Applications of tests include the following:
    - 1. Interior Piping
      - a. Domestic hot water and hot water return
- 1.3 REFERENCE STANDARDS
- A. Refer to Section 220000 for a general description of requirements applying to this section.
- 1.4 QUALITY ASSURANCE
- A. Refer to Section 220010 for a general description of requirements applying to this section.
- 1.5 SUBMITTALS
- A. Submit balancing report in accordance with Section 220000.
- 1.6 WARRANTY/GUARANTEE
- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

#### PART 2 – PRODUCTS

- 2.1 PIPE & FITTING REPLACEMENTS
- A. Refer to Section 220010 for replacement of any defective pipe or fittings. Replacement shall include all required draining of system, removal and replacement and uncovering, recovering.

#### PART 3 – EXECUTION

#### 3.1 GENERAL

- A. All new hot water return piping installed or wherever system valves are being replaced, the system shall be tested, balanced and approved before concealing. Failure to secure the approval of the Municipal Inspector, A/E Inspector or the Inspector of the Owner makes it mandatory for the Contractor to completely expose the piping for balancing. All expense involved in the uncovering of the piping for the balancing and recovering shall be borne by the respective Contractor with no change in Contract.
- B. All equipment, material and labor required for balancing a plumbing system or part thereof shall be furnished by the Plumbing Contractor responsible for installing the work.

### 3.2 INTERIOR PIPING

- A. Domestic Hot Water Return System: Upon completion of the testing of the domestic hot water supply and recirculation systems, a final procedure is to be performed to obtain uniform circulation within each hot water loop of the domestic hot water system. At the ends of the hot water mains, or wherever a branch return line connects to the main return line, there shall be three (3) valves: ball valve, check valve and balancing valve. These valves are to be installed in an accessible space at/or above the ceiling or where indicated on the drawings.
- B. Based on an Accu-Flo balancing valve, the use of a differential pressure gauge Model No. 779 shall be used to achieve the greatest accuracy.

END OF SECTION 220191

### SECTION 230200: GENERAL PROVISIONS – HVAC

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to work of this Section.
  - B. This specification or drawing and the design features or resulting construction disclosed, are the property of Furlow Associates, Inc., and shall not be reproduced without written permission.

#### 1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and supervision necessary to install complete operating HVAC Systems, including all work at the site and within the proposed construction areas to accomplish the required work.
- B. Wherever the term "provide" is used, it shall be understood to mean both "furnish" and "install".
- 1.3 REGULATIONS, CODES AND STANDARDS
  - A. Work shall be performed in accordance with latest adopted codes, regulations and ordinances by authorities having jurisdiction. Observe all safety regulations.
  - B. Obtain all permits and inspection certificates and pay all charges.
  - C. Latest editions of any referenced standards shall govern.

### 1.4 RELATED WORK

- A. Refer to equipment shown or specified in sections of Division 1 thru 14 and 26 that will require Mechanical services and provide such service.
- B. Refer to work related to HVAC as shown on the following contract drawings:

Architectural & Structural Plumbing Electrical

C. This Contractor shall coordinate with the work of Division 16 and the Fire Alarm System vendor for locations and mounting of all duct smoke detectors. These devices are shown on the Mechanical Drawings for reference only to show the intent of the work. All locations shall be determined based on approved shop drawings from the Fire Alarm System vendor and the Contractor for the work of Division 26, Electrical.

#### 1.5 COORDINATION

- A. The Mechanical, Plumbing and Electrical Contractors are responsible to coordinate all manufacturer's recommended circuit breakers, starters, disconnects and fuse sizes for all equipment. Submission of a shop drawing will certify that this has been completed. Any necessary changes required will be included as part of this contract.
- B. Mechanical Contractor shall coordinate scheduling, submittals and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of independent work elements, with provisions to accommodate items that may be installed at a later time.
- C. Mechanical Contractor shall verify utility requirements and all characteristics of operating equipment are compatible with the building utilities. Coordinate the work of all sections related and required for installing, connection and placing in service of all equipment.
- D. Mechanical Contractor shall coordinate all space requirements, supports and installation of all mechanical, electrical, plumbing and fire protection work, which are indicated diagrammatically on the Drawings. Verify routing of all pipes, ducts, conduits and equipment connections. Maximize accessibility for other work, and service requirements for maintenance and repairs. Develop overall coordination drawing (all trades) and submit for review prior to fabrication/installation.
- E. Obtain written confirmation from all related trade Contractors and the Owner or his representative that requirements, conflicts and coordination issues have been discussed and resolved.
- F. Submit coordination drawings to verify access and clearances.

# 1.6 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, crawl spaces, 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 installation within unheated shelters.

#### 1.7 SUBMITTALS

- A. Shop Drawings:
  - 1. Shop drawings shall be submitted in accordance with Division 1 of these specifications except where herein modified.
  - 2. Shop drawings comprising complete catalog cuts, performance test data for HVAC equipment as required by other sections of Division 23, shall be submitted for review checking. The Contractor shall review these shop drawings for conformance to contract documents prior to submission and affix contractor's signature to each submittal certifying that this review has been done. By approving and submitting shop drawings, product data, samples and similar materials, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction data that relates to the work, and has checked and coordinated this information with all of the requirements contained in the contract documents for the work of all trades.
    - a. The Contractor and equipment manufacturer shall clearly indentify in all submittals and shop drawings any and all applications standards which require additional work to accommodate this equipment and provide a complete and operational system as described in the contract documents.
    - b. The Contractor shall be completely responsible for any and all additional costs associated with the changes required by this and all other trades.
  - 3. Submit a 1/4" scale layout of all mechanical equipment rooms. All equipment and pads shall be to scale of equipment being furnished. Obtain size information of any and all equipment from other trades and indicate on drawings. The drawings shall be fully coordinated with all trades prior to submission. Indicate coil pull areas, filter pull areas, maintenance clearances, and access as applicable.
  - 4. All shop drawing submittals shall have the following identification data, as applicable, contained therein or permanently adhered thereto.
    - a. Project name.
    - b. Project number.
    - c. Sub-contractor's, vendor's and/or manufacturer's name and address.
    - d. Product identification.
    - e. Identification of deviation from contract documents.
    - f. Applicable contract drawings and specification section number.
    - g. Shop drawing title, drawing number, revision number, and date of drawing and revision.
  - 5. Resubmit revised or additional shop drawings as requested.
  - 6. Wherever shop drawings or vendor's standard data sheets indicate work to be done "by others", it shall be the responsibility of the contractor making the submission to identify by name, the contractor who is to do this work. If the contractor named is other than the contractor making the submission, the shop drawing submission must be reviewed by the named contractor and bear his mark of approval, prior to submission to the Architect/Engineer.

- 7. Where equipment proposed differs from that shown on the drawings or specified, he shall submit for approval drawings showing the manner in which the layout is affected by the substitution.
- 8. The Contractor shall keep one copy of approved shop drawings at the job site,, filed in a suitable metal container. The shop drawings shall be cataloged and kept in good repair, and shall be available for use by the Owner, Architect and Engineer.
- 9. No equipment shall be ordered, fabricated, etc., before approval of shop drawings.
- B. Contractor is responsible for the shop drawing coordination and interface with the work of other contracts and adjacent work. The relationship of Contractor's work shall be verified as it relates to adjacent and critical features of the work of this and all contracts and materials.
- C. The Contractor shall submit a complete schedule of all shop drawings required for the scope of work covering all materials and equipment listed in all sections of Division 23, Mechanical, including all documents required for contract closeout, Owner instructions and training, and all turnover items at the completion of the work. This schedule shall be submitted for review and approval within thirty days of contract award and before any subsequent materials are provided for review.
- D. The shop drawings provided by the Contractor will be reviewed only once and resubmittals will be reviewed only once. Any other submittals will be billed to the Contractor at the Engineer's standard rates.

# 1.8 SITE INSPECTION

- A. The Contractor shall visit site, inspect, and become aware of all conditions which may effect the work during the estimation phase of his work prior to bid openings. Investigate utilities, protection requirements for adjacent facilities, storage locations, and access to the construction area.
- B. Submission of a bid will be deemed evidence of having complied with this requirement.

# 1.9 SUBSTITUTIONS

- A. Whenever a material, article, piece of equipment or system is identified in the following specification or indicated on the drawings by reference to manufacturers' or vendors' names, trade names, catalog numbers or the like, it is so identified for the purpose of establishing the basis of the Bid.
- B. Substitution approval must be obtained and included as an addendum item prior to the submission of the bid. An approved substitution shall not be considered as an approval for the Contractor or an equipment vendor to deviate from the written portion of the specifications unless so stated in the addendum.
- C. The drawings illustrate the space allocated for equipment and the Contractor shall install the equipment accordingly. If changes are required in the building or arrangement due to substitution of equipment, the Contractor making the substitution must pay for the necessary modifications.
- D. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents. This shall include,

but not be limited to all: space requirements, code clearances, type-horsepower-capacities-number and size of services required from other trades including all auxiliary items provided by this Contractor and all other trades, and all manufacturer's specific equipment applications standards and requirements, for approved equipment including that which is basis of design or a substitution. The bidding related contractor and equipment manufacturers shall clearly identify in all submittals and shop drawings any and all applications standards which require additional work to accommodate this equipment and provide a complete and operational system as described in the contract documents. If the bidding contractor or manufacturer does not comply with these requirements then they shall be completely responsible for any and all additional costs associated with the changes required by this and all other trades.

E. Where only one brand name or manufacturer is identified, no substitutions are permitted.

## 1.10 LUBRICATION

- A. Provide and maintain all required lubrication of any equipment operated prior to acceptance by the Owner. Lubrication shall be as recommended by the equipment manufacturer.
- B. Provide one year's supply of lubricants to Owner at date of acceptance.
- C. Verify that required lubrication has taken place prior to any equipment start-up.

## 1.11 EQUIPMENT START-UP

- A. Verify proper installation by manufacturer or his representative.
- B. Advise Construction Manager 2 days prior to actual start-up.
- C. Verify proper operation. Obtain signed statement by manufacturer or his representative that equipment is operating within warranty requirements. Submit statement to Construction Manager.
- D. Perform field mechanical balancing in accordance with Section 230950: TESTING AND BALANCING OF MECHANICAL SYSTEMS.
- E. The Mechanical Contractor shall own as part of his work, the following:

Provide one (1) additional drive set, if necessary, to obtain final design balancing requirements. The Mechanical Contractor shall coordinate with Balancing Firm and equipment manufacturer for drive selection, including belts and pulleys.

## 1.12 OPERATION & MAINTENANCE INSTRUCTIONS

- A. Properly and fully instruct Owner's personnel in the operation and maintenance of all systems and equipment.
  - 1. Contractor to demonstrate all systems to Engineer for verification of operation prior to Owner's instruction period.
  - 2. Provide two (2) 1-hour sessions of training to School Maintenance Staff.

- B. Insure that the Owner's personnel are familiar with all operations to carry on required activities.
- C. Such instruction shall be for each item of equipment and each system as a whole.
- D. Provide report that instruction has taken place. Include in the report the equipment and/or systems instructed, date, contractor, Owner's personnel, vendor, and that a complete operating and maintenance manual has been reviewed.
- E. Manual shall include all instructions on operation, maintenance, repair parts list, lubrication requirements, brochures, catalogue cuts, complete schedule of air filters for each unit type in Excel spreadsheet format, wiring diagrams, piping diagrams, control sequences, service requirements, names and addresses of vendors, suppliers and emergency contacts. Three manuals shall be provided.
- F. Submit manuals for review prior to operating instruction period. Manuals shall be 8-1/2 x 11" with hard cover, suitably bound.
- G. Provide to the Owner any special tools necessary for operation and routine maintenance of any of the equipment.
- H. Upon completion of the project, the Mechanical Contractor shall provide a complete set of legible asbuilt drawings for the Owner.
- 1.13 TOOLS
  - A. All equipment furnished by the Mechanical Contractor which requires special tools or devices other than those normally available to the maintenance or operating staff shall be furnished in duplicate to the Owner, sufficiently marked, packed or boxed for staff usage. The tools provided shall be listed by the Mechanical Contractor identified as to their use or the equipment applicable in a written transmittal to the Owner.

# 1.14 CLEANING AND FINISHING

- A. After equipment start-up and all operating tests have been made and the system pronounced satisfactory, each respective Contractor shall go over the entire project, clean all equipment, etc., installed by him and leave in a clean and working condition. Any surfaces found marred after this final cleaning shall be refinished or replaced by each Contractor at no cost to the Owner.
- B. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage. Provide adequate and proper storage facilities during the progress of the work. Special care shall be taken to provide protection for bearings, open connections, pipe coils, pumps, compressors and similar equipment.
- C. All fixtures, piping, finished surfaces and equipment shall have all grease, adhesive labels and foreign materials removed.
- D. All piping shall be drained and flushed to remove grease and foreign matter. Pressure regulating assemblies, traps, and similar items shall be thoroughly cleaned. Remove and thoroughly clean and reinstall all liquid strainer screens after the system has been in operation ten (10) days.

- E. When connections are made to existing systems, the Mechanical Contractor shall do all cleaning and purging of the existing systems required to restore them to the condition existing prior to the start of work.
- F. Clean-up: Remove from the premises, all unused material and debris resulting from the performance of work under this section.

## PART 2 – PRODUCTS

## 2.1 GENERAL

- A. All material and equipment shall be new and of present day manufacture, and shall conform to accepted standards of the trade where such a standard has been established for the particular type of equipment or material.
- B. Whenever equipment or material is referred to in the singular, such as "the fan", it shall be deemed to apply to as many such items as necessary to complete the work.
- 2.2 PRODUCT DELIVERY, STORAGE AND HANDLING
  - A. During loading, transporting and unloading exercise care to prevent damage to material.
  - B. Store all materials in dry enclosures or under protective coverings out of way of work progress.
  - C. Material shall not be allowed to be stored directly on ground.
  - D. Deliver in manufacturer's original cartons or on skids.
  - E. Handle and protect so as to prevent damage to product or any surrounding material.

## 2.3 CONCRETE

- A. Concrete shall be in accordance with Section 03300.
- 2.4 WARRANTY
  - A. Wherever in the specification sections of this division, reference is made to a specific warranty period, this warranty shall be in addition to and not a limitation of other rights the Owner may have against the Mechanical Contractor under the contract documents.

# PART 3 – EXECUTION

- 3.1 **PROTECTION** 
  - A. Plug or cap open ends of piping systems, conduit and ductwork.
  - B. Stored materials shall be covered to prevent damage by inclement weather, sun, dust or moisture.

- C. Protect all installed work until accepted in place by the Owner.
- D. Plates, polished metal escutcheons, thermostats and other finished devices shall not be installed until masonry, tile, and painting operations are complete unless otherwise protected.
- E. Protect all work from operations which may cause damage such as hauling, welding, soldering, painting, insulating and covering.

## 3.2 WORKMANSHIP

- A. Install all work neat, trim and plumb with building lines.
- B. Install work in spaces allocated.
- C. Cutting and patching shall be performed by skilled tradesmen normally employed for the work involved.
- D. This Contractor shall provide a complete weathertight seal to all new systems in the building including the necessary caulking, weather-stripping and insulation.
- 3.3 EQUIPMENT SETTING
  - A. Provide as a minimum, a 4 inch concrete pad beneath all floor-mounted equipment. Install anchor bolts in pour.
  - B. Provide as a minimum, spring vibration isolation under any equipment 10 HP and over and rubber in shear vibration isolation on any equipment up to 10 HP. For further specifications and additional requirements, refer to other sections.
  - C. Concrete shall be 3,000 psi, 28 day compressive strength in accordance with ACI-613. Reinforce with No. 4 rod 12" on centers both ways or as otherwise detailed.
- 3.4 FASTENERS, HANGERS AND SUPPORTS
  - A. Provide all hangers and supports required to suspend, mount, or hang the work.
  - B. Provide all miscellaneous steel angles, channels, beams, clips, brackets and anchors necessary to hang or support the work. Provide submissions for review.
  - C. Install concrete inserts before concrete is poured.
  - D. Drilled inserts shall not be loaded more than 1/4 rated capacity.
  - E. Power-driven fasteners shall not be allowed for piping larger than 2 inch, or equipment. When used they shall not be loaded more than 1/8 rated capacity or 200 pounds.
  - F. All hangers, miscellaneous steel, braces and supports shall be galvanized, cadmium plated, or primed steel. Copper tubing shall be supported with copper hangers.

- G. Piping shall be supported from adjustable clevis type hangers with insulation pipe saddles or pipe shields in accordance with piping support spacing table on the drawings. Where hangers are 18" or longer provide lateral bracing at every fourth hanger.
- H. Support vertical piping at floor levels. Piping shall have split rings.
- I. Any lintels required for openings for this work if not indicated on Architectural or Structural drawings shall be provided under this Section.

## 3.5 SLEEVES

- A. Provide each pipe, duct or conduit passing through a masonry or concrete wall, floor or partition with a sleeve made from standard weight steel pipe for pipe or conduit and No. 12 gauge galvanized steel for ducts, with smooth edges, securely and neatly cemented in place. Provide each pipe, duct or conduit passing through a frame or metal partition with a sleeve made from No. 22 gauge galvanized sheet metal, securely fastened in place.
- B. Be responsible for the proper location and alignment of all sleeves.
- C. Provide hydrostatic seals for sleeves passing through outside walls, either above or below grade, or through hydrostatically sealed slabs or floors on grade. Provide fire-rated seals for all sleeves which penetrate fire-rated walls.
- D. Install both piping and sleeve seals so as to maintain integrity of seals with expansion and contraction of piping.
- E. Set floor sleeves flush with floor surface in finished areas, 1" above the finished floor in kitchens, cafeterias, and similar service areas unless such areas are slab-on-grade; 1" above the floor in mechanical rooms, pipe chases, pipe spaces and other unfinished areas, unless otherwise indicated, and flush with the underside of slabs. Extend wall and partition sleeves through and cut flush with each surface unless otherwise indicated or specified.
- F. Select sleeves two pipe sizes larger than any pipe or conduit that is to remain uncovered, unless otherwise required by the sealing method specified. Where pipes are to be covered, provide sleeves large enough to allow the covering to pass through the sleeves with sufficient clearance for sealing as specified hereinafter. Size sleeves for branch piping from vertical risers large enough to permit vertical expansion at the riser.
- G. Select duct sleeve sizes to suit requirements of fire dampers and sealing methods as specified.
- H. Place sleeves imbedded in concrete floors or walls in the forms before concrete is poured; sleeves shall have integral waterstop flanges, where they are to receive either watertight or hydrostatic seals.
- I. Install sleeves passing through above-grade floors of mechanical rooms, toilet rooms, kitchens or similar service areas where liquid leaks or spillover may occur in a watertight manner. Sleeves shall be such that waterproofing membrane can be flashed around and into the sleeve where necessary.
- J. Seal sleeves for pipes or conduit passing through ceiling air plenum walls or the floor above air tight in a manner similar to that specified for fire-rated sleeves.

- K. Hydrostatic Sealing Method: Provide compressible synthetic rubber seals, equivalent to LINK SEAL, manufactured by the Thunderline Corporation, or THRUWALL manufactured by O.Z. Gedney. Install seals in accordance with the manufacturer's recommendations to provide air tightness aboveground and hydrostatic sealing belowgrade. Caulking or other type mastic is not acceptable.
- L. Fire-Rated Sealing Method:
  - 1. Sleeves, openings and sealants shall comply with applicable codes, recommended practices and standards, and manufacturer's instructions. Fire sealants shall have ability to prevent spread of flame, smoke or water throughout the penetration and shall pass 3 hour test, UL test ASTM E814 and UL 1479.
  - 2. Products: Chase Corporation CTC PR-855, O. Z. Gedney CRS/CAFS, 3M Electro-Products Division Putty 303 or Caulk CP25 penetration sealing kits, General Electric Company sealants type RTV-850, 6428 or 7403, Thunderline Corporation "Link-Seal Pyro-Pak". Installation and type of sealant to be used as recommended by the manufacturer.

### 3.6 PLATES

- A. Provide chrome plated plates wherever piping passes into finished area.
- B. Plates shall be securely fastened to piping or building construction.
- C. Floor plates shall cover 1 inch sleeve extension.
- 3.7 OFFSETS, TRANSITIONS, MODIFICATIONS
  - A. Provide all offsets necessary to install the work and to provide clearance for other trades.
  - B. Maintain adequate headroom and clearance.
  - C. Incidental modifications necessary to the installation of the systems shall be made as necessary and as approved by the Architect.
- 3.8 RECESSES
  - A. Furnish information to the Construction Manager as to sizes and locations of recesses required to install panels, boxes, and other equipment or devices which are to be recessed in walls.
  - B. Make offsets or modifications as required to suit final locations.

## 3.9 LABELING

- A. All HVAC equipment such as pumps, fans, air handling units, and devices requiring identification for operating procedures shall be provided with permanent black laminated micarta white core labels with 3/8 inch letters.
- B. This shall also apply to all controllers, remote start/stop pushbuttons and equipment cabinets.

- C. This shall not apply to individual room thermostats.
- D. All Mechanical Rooms shall be identified with a permanent placard of red-white-red laminated, commercial grade, plastic construction. Letters shall be minimum one inch high and read in capital letters: WARNING MECHANICAL EQUIPMENT ROOM LIMITED ACCESS. Placard shall be centered on each door leading into the mechanical room at five feet above the floor and attached at each corner with brass screws.
- E. Refrigeration Machinery Rooms shall be identified with a permanent placard of red-white-red laminated, commercial grade, plastic construction. Letters shall be minimum one inch high for the header to read in capital letters: WARNING REFRIGERATION EQUIPMENT ROOM LIMITED ACCESS. The following information shall be posted in a similar fashion, minimum half-inch high capital letters, indicating:
  - 1. The name and address of the installer.
  - 2. The refrigerant number and amount of refrigerant in pounds.
  - 3. The lubricant identity and amount in pounds or ounces as appropriate.
  - 4. The field test pressure applied to the equipment in psig.

Placard shall be centered on each door leading into the refrigeration equipment room at five feet above the floor and attached at each corner with brass screws.

F. At all fire damper, smoke damper and combination fire/smoke damper locations, access doors in ductwork shall be identified with a permanent placard of red-white-red laminated commercial grade plastic construction, minimum one-half inch high capital letters, reading, "FIRE DAMPER", "SMOKE DAMPER", "FIRE/SMOKE DAMPER" as appropriate for the installation. Attach securely to face of access door with brass screws at each corner, sealed airtight.

## 3.10 FLASHING AND COUNTERFLASHING

- A. Roof curbs, etc., shall have counterflashing fittings. General Contractor shall provide flashing.
- B. Piping and conduit thru the roof shall be flashed by the General Contractor. Provide counterflashing.
- C. Provide curbs with base features required to match roof materials, finishes and configuration; e.g., flat, sloped, raised seam, etc.

### 3.11 ACCESS

- A. Locate all equipment, valves, devices and controllers which may need service in accessible places.
- B. Where access is not available, access panels shall be provided. Furnish access panels to the Construction Manager for installation.
- C. Access panels shall be Nailor-Hart Industries, Karp Co., or Controlled Air Manufacturing Limited, with 16 gauge frames and 14 gauge steel door, prime painted.
- D. Maintain access clearances for tube or fan removal, coil pulls, and filter removal.

### 3.12 WIRING AND MOTOR CONTROLS

- A. Packaged equipment shall be furnished with disconnect switches, starters, overloads, factory furnished and wired by the unit manufacturer.
- B. Roof-mounted exhaust fans, except utility sets, rated less than 1/2 HP at 115 volts, single phase, shall be furnished with disconnect switches, factory furnished and wired by unit manufacturer.
- C. Rooftop equipment shall be furnished with starters, disconnect switches, overloads, factory furnished and wired by unit manufacturer.
- D. This Contractor shall furnish all information and assistance required for the Electrical Contractor to purchase all motor starters that are not specified to be part of the mechanical equipment.
- E. Control wiring shall be provided under this Division of the work.
- F. All wiring shall be in accordance with the National Electrical Code and as recommended by the equipment manufacturer.

# 3.13 UTILITIES

- A. Do not interrupt any utility or service to the Owner without adequate previous notice and schedule.
- 3.14 OPENINGS CUTTING, REPAIRING
  - A. This Contractor shall cooperate with the work to be done under other sections in providing information as to openings required in walls, slabs and footings for all piping, ductwork and equipment, including sleeves where required.
  - B. Any drilling or cutting required for the performance of work under this Section, shall be the responsibility of this Contractor and the cost thereof shall be borne by him.
  - C. Holes in Concrete: Sleeves shall be furnished, accurately located and installed in forms before pouring of concrete. This Contractor shall pay all additional costs for cutting of holes as the result of the incorrect location of sleeves. All holes through existing concrete shall be either core drilled or saw cut. All holes required shall have the approval of the Structural Engineer prior to cutting or drilling.
  - D. It shall be the responsibility of this Contractor to ascertain that all chases and openings are properly located.
- 3.15 PAINTING
  - A. The General Contractor shall be responsible for painting.
- 3.16 GUARANTEE
  - A. All work shall be guaranteed to be free from defects for a period of one year of operation from date of acceptance by the Owner.

- B. Guarantee shall be extended on an equal time basis for all non-operational periods due to failure within the guarantee period.
- C. All materials and equipment provided and/or installed under this section of the specifications shall be guaranteed for a period of one year from date of acceptance of the work by the Owner unless otherwise specified in Division 1. Should any trouble develop during this period due to defective materials or faulty workmanship, the Mechanical Contractor shall furnish necessary labor and materials to correct the trouble without any cost to the Owner. Any defective materials or inferior workmanship noticed at time of installation and/or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner.
- D. In the event of occupancy by the Owner prior to final acceptance of the project, the guarantee date for equipment placed in operation shall be mutually agreed to by the Mechanical Contractor and the Owner's representative.
- E. Contractor to include an 11 month "walk-thru" of the building systems with representatives of the School District, Architect, Engineer and the Construction Manager. The purpose is to establish a list of corrective work that relates to operational issues, material/installation deficiencies, etc. prior to the expiration of the guarantee period.

# 3.17 DRAWINGS

- A. The Mechanical Systems are indicated on the Contract Drawings. Certain pertinent information and details required by the Mechanical Work appear on the Architectural, Structural and Electrical Drawings; become familiar with all drawings, and incorporate all pertinent requirements.
- B. Drawings are diagrammatic and indicate the general arrangement of systems and requirements of the work. Do not scale drawings. Exact locations of fixtures and equipment, not specifically shown, shall be obtained before starting work.

# 3.18 TESTING AND BALANCING OF MECHANICAL EQUIPMENT

- A. Perform field mechanical balancing in accordance with Section 230950: TESTING AND BALANCING OF MECHANICAL SYSTEMS.
- B. The Mechanical Contractor shall own as part of his work, the following:

Provide one (1) additional drive set, if necessary, to obtain final design balancing requirements. The Mechanical Contractor shall coordinate with Balancing Firm and equipment manufacturer for drive selection, including belts and pulleys.

# END OF SECTION 230200

## SECTION 230210: BASIC MATERIALS AND METHODS – HVAC

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
  - B. Refer to Section 230200 for HVAC General Provisions.
  - C. Refer to other sections in Division 23 for materials and methods not specified herein.
- 1.2 DESCRIPTION OF WORK
  - A. Included in this Section are the following:
    - 1. Steel Pipe and Fittings
    - 2. Copper Tubing & Fittings
    - 5. Grooved End Pipe (Gruvlok) or (Victaulic)
    - 6. Strainers
    - 7. Thermometers
    - 8. Gauges
    - 9. Test Stations Pressure/Temperature
    - 10. Isolating Fittings
    - 11. Pipe Saddles
    - 15. Unions
    - 16. Motors
- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 230200 for a general description of requirements applying to this section.
  - B. Install work to meet the requirements of the following:
    - 1. New Castle County Dept. of License and Inspections
    - 2. International Mechanical Code
    - 3. Gas Utility Company
    - 4. NFPA
    - 5. OSHA
    - 6. ASHRAE
    - 7. Manufacturer's Standardization Society (MSS) of the valve and Fittings Industry, Inc.:
    - SP-58 Pipe Hangers and Supports Materials, Design and Manufacture.
    - SP-69 Pipe Hangers and Supports Selection and Application
  - C. Appliances and materials governed by UL requirements shall meet such requirements and bear the label.

#### 1.4 QUALITY ASSURANCE

- A. Provide adequate supervision of labor force to assure that all aspects of the specifications are being fulfilled.
- B. Verify that all work and equipment is installed in accordance with manufacturer's warranty requirements.

### PART 2 – PRODUCTS

- 2.1 STEEL PIPE AND FITTINGS
  - A. Water Piping:
    - 1. ASTM A53 seamless, Schedule 40.
    - 2. Fittings up to 2 inch shall be 150 lb. malleable iron, screwed pattern ASME B16.3. Butt weld, ASME B16.9, same thickness as pipe.
    - 3. Fittings 2-1/2" and larger shall be butt weld ASME B16.9, same thickness as pipe.
    - 4. Weld-O-Lets and Thread-O-Lets shall be maximum of two sizes smaller than main size; i.e., maximum of a 2-inch Weld-O-Let on a 3-inch pipe.
    - 5. Thread tape shall be teflon tape, 3 mils minimum thickness.

# 2.2 COPPER TUBING & FITTINGS

- A. Refrigeration Piping:
  - 1. Copper tubing: Type ACR, hard drawn temper.
  - 2. Fitting: Wrought-copper, solder joints, ASME B16.22 or ASME B16.26.
  - 3. Joints: Brazed, American Welding Society (AWS) Class BCUP-5 for brazing filler metal.
- B. Water Piping:
  - 1. Tubing: Hard drawn seamless ASTM B-88 Type "L" aboveground.
  - 2. Soft seamless ASTM B-88 Type "K" below-ground.
  - 3. Joint Material: Brazed joints, low temperature silver-bearing solder.
    - a. Flux shall be non-toxic type and non-corrosive.
  - 4. Fittings: ASME B16.15, B16.18, B16.22, or B16.26.

## **BASIC MATERIALS AND METHODS – HVAC**

- C. Condensate Drain Piping:
  - 1. Pipe: Copper tubing Type DWV.
  - 2. Fittings: Wrought copper solder type drainage fittings, ASME B16.23 or B16.29.

# 2.3 GROOVED END PIPE (VICTAULIC)

- A. All pipe shall be prepared in accordance with (ANSI/AWWA C-606). (CSA B242-M1980). (MIL-P-11087C Grooved End Pipe), or Victaulic (manufacturer's) published specifications as appropriate according to pipe materials, wall thickness, size and method of joining, as further detailed in Paragraph G: Pipe Preparation. In the event of conflict, Victaulic data shall prevail.
  - 1. Iron Pipe Size: Pipe shall conform in size (outside diameter) to ANSI B-36.10 (API-5L) and/or to Victaulic (Manufacturer's) published outside diameter tolerances.
    - a. Steel Pipe (CSI-15061): Steel pipe shall be black, conforming to ASTM A-53, Grade B, 3/4 1-1/2" (20-40 mm) Type F and 2 24" (50-600mm) Type E or S or hot-dip galvanized.
- B. Couplings shall consist of two ductile iron cast housings, a synthetic rubber gasket of a central cavity pressure-responsive design, with nuts, bolts, locking toggle or lugs to secure unit together.
  - 1. Coupling Housings: Shall be cast of ductile iron conforming to ASTM A-536 (Grade 65-45-12) enamel coated, hot dip galvanized to ASTM A-153 or zinc electroplated to ASTM B-633, as manufactured by Victaulic Company of America. Refer to Victaulic product specifications for other materials.
    - a. Coatings: Shall consist of an enamel paint or hot dip galvanizing to ASTM A-153, or zinc electroplating to ASTM B-633 as specified.
  - 2. Couplings for End Steel Pipe: Shall be Victaulic couplings for grooved and steel pipe prepared under "Grooved End Pipe". Couplings shall comply with ASTM F1476 Standard Specification for the Performance of Gasketed Mechanical Couplings for Use In Piping Applications.
    - a. Line, Fittings and Valve Joints: Shall be Victaulic flexible Types Installation Ready Style 177, Style 75, 77 and rigid as required.
    - b. Rigid Joints: Coupling housings shall be cast with offsetting, angle-pattern bolt pads to provide joint rigidity and support and hanging in accordance with ANSI B31.1 and B31.9.
      - 1) Victaulic Style 107H, Installation Ready, for direct slab installation without field disassembly, with grade EHP gasket, suitable for water service to +250 deg. F.
      - 2) Victaulic Style 07 "Zero-Flex".
    - c. 14" and Larger: AGS Series two-segment couplings, with lead-in chamfer on housing key and wide width FlushSeal gasket. Victaulic Style W07 (rigid) and Style W77 (flexible).
    - d. Reducing Joints: Shall be Victaulic Style 750 Reducing couplings for pipe to pipe joints or to create reducing fittings using straight fitting configurations.

- e. Outlets: All joints designed Outlet Couplings or where feasible to replace reducing outlet tees, shall be Victaulic Style 72 Outlet couplings male threaded outlet.
- f. Flanged Connections: Shall be Victaulic Style 741 /W741 (2 24") Vic-Flange adapters, engaging directly into grooved pipe and bolting directly to ANSI Class 125 cast iron or Class 150 steel flanged components.
- C. Couplings for Grooved End Ductile Iron Pipe: Shall be Victaulic couplings for radius cut grooved ductile iron pipe preparation.
  - 1. Line and Fittings Joints: Shall be Victaulic Style 31 couplings.
  - 2. Flanged Connections: Shall be Victaulic Style 341 (4-24") (100-600mm) Vic-Flange adapters, engaging directly into grooved end pipe and bolting directly to ANSI Class 125 cast iron or Class 150 steel flanged components. Installer to supply standard flange bolts.
  - 3. For direct connection to IPS steel pipe sizes, couplings shall be Victaulic Style 307 transition couplings.
- D. Coupling Components:
  - 1. Gaskets shall be molded of synthetic rubber in a central cavity, pressure-responsive configuration conforming to the pipe outside diameter and couplings housing, of elastomers having properties as designated in ASTM D-2000. Reference always shall be made to the latest published selection guide for Victaulic gaskets for proper gasket selection for the intended service.
    - a. Water Service: Gasket supplied for water services from -30 deg. F to +230 deg F (-34 deg. C to +110 deg. C) shall be a Grade "E" EPDM compound, with green color code, molded of materials conforming to ASTM D-2000, designation 2CA615A25B24F172, recommended for hot water service within the specified temperature range, plus a variety of dilute acids, oil-free air, and many chemical services. Not recommended for petroleum services.
  - 2. Bolts and Nuts shall be heat treated carbon steel, track head, conforming to physical properties of ASTM A-449 and A-183 minimum tensile 110,000 psi, zinc electroplated to ASTM B-633, as supplied or specified.
    - a. Other Fasteners: Fasteners to certain products may vary from the specification as noted with each product.
- E. Fittings: Shall be Victaulic full flow cast fittings, steel fittings or segmentally welded fittings with grooves or shoulders designed to accept Victaulic grooved end couplings.
  - 1. Standard Fittings: Shall be cast of ductile iron conforming to ASTM A-536 (Grade 65-45-12) painted with enamel or hot dip galvanized to ASTM A-153 or zinc electroplated to ASTM B-633 as required.

- 2. Standard Steel Fittings: Including large size elbows (16-24"/400-600mm) shall be forged steel conforming to ASTM A-234 Grade WPB (0.375" wall), painted with enamel or hot-dip galvanized to ASTM A-153.
- 3. Standard Segmentally Welded Fittings: Shall be factory-fabricated of Schedule 40 carbon steel pipe as follows: 3/4 1-1/2" (20-40mm) conforming to ASTM A-53 Type F, 2 10" (50 250mm) Schedule 40 conforming to ASTM A-53, Type E or S, Grade B, 12 24" (300 600mm) 0.375" wall conforming to ASTM A-53, Type E or S, Grade B, painted with enamel or hot-dip galvanized to ASTM A-153.
- F. Branch outlets for hole cut steel pipe: Shall be Victaulic hole cut products, cast of materials as in Paragraph 4a, with gasket as detailed in Paragraph 3c, on pipe preparation in Paragraph G.
- G. Gauge, Meter Outlets for Hole Cut Steel Pipe: Shall be Victaulic strapless mechanical outlet products Style 923 Vic-Let, or 924 Vic-O-Well and shall provide a pipe outlet without a need for a strap or lower housing to wrap around the pipe.
- H. Pipe Preparation: Shall be prepared in accordance with the latest published Victaulic specifications, ANSI/AWWA C-606, CSA B-242, UL, FM, NFPA or other standards as applicable. Pressure ratings and end loads for cut grooved pipe are based upon tests on pipe prepared in accordance with Victaulic specifications.
- I. Steel Pipe: Shall be steel pipe conforming to ASTM A-53 Grade "B", 1-1/2" (25-40 mm) Type F, 2-14" (50 600 mm) Type E or S.
  - 1. Grooved End Pipe: Shall be grooved in accordance with Victaulic Standard Specifications.
    - a. Standard Weight Pipe shall be square cut grooved.
- J. Assembly: Couplings, fittings, valves and pipe shall be assembled in accordance with latest published instructions from Victaulic Company of America for the particular product installed.
  - 1. Pipe: Shall be checked to be certain it is sufficiently free of indentations, projections, grooves, weld seams, or roll marks on the exterior of the pipe over the entire gasket seating area to assure a leak-tight seat for the gasket, that pipe ends are square cut and that preparation is in accordance with Victaulic pipe preparation standards.
  - 2. Gasket: All gaskets shall be of the central cavity pressure-responsive design. Gasket style and elastomeric material (grade) shall be checked to be certain gasket supplied is suited for the intended service.
  - 3. Lubrication shall always be used for proper coupling/fitting assembly as follows:
    - a. Thorough lubrication of the gasket exterior including the lips and/or pipe ends and housing interiors, is essential to prevent pinching the gasket. Lubrication assists proper gasket seating and alignment during installation.
    - b. Use Victaulic Lubricant for installation. Other compatible materials such as silicone and others may be used; however, petroleum based lubricants must not be used on Grade "E" or "M" gaskets.

- c. A thin coat of Victaulic lubricant shall be applied by brush or by hand by: 1) brushing on the gasket lips (ID) and the entire exterior of the gasket; 2) brushing lubricant on the pipe ends around the entire pipe circumference and inside the coupling housing.
- 4. The coupling manufacturer's factory trained representative shall provide on-site training for the contractor's field personnel in the use of grooving tools and installation of product. The representative shall periodically visit the job site to ensure best practices in grooved product installation are being followed. (A distributor's representative is not considered qualified to conduct the training.)

# K. Support:

- 1. The requirements of MSS-SP-69 "Pipe Hangers and Supports"- Selection and Application: shall, in general, govern the installation of hangers and supports, in accordance with the following recommendations:
  - a. Piping joined with grooved type couplings, like all other piping systems, requires support to carry the weight of pipes and equipment. Like all other methods of jointing pipes, the support or hanging method must be such as to eliminate undue stresses on joints, piping and other components. Additionally, the method of support must be such as to allow movement of pipes where required and to provide for other special requirements such as drainage, etc., as may be required by the designer. The support system for mechanical grooved type pipe couplings must consider some of the special requirements of these couplings.

# 2.4 STRAINERS

- A. Perforations: .033" pipe size to 2", .057" pipe size 2-1/2" to 4", 1/8" pipe size 6" and up.
- B. Self-cleaning "Y" type screwed end up to 2 inch with machined seats with blow-off outlet, stainless steel screen, iron body.
- C. Self-cleaning "Y" type flanged 2-1/2 inch and up, with bolted cover flange, blow-off outlet, 125 psi ANSI, brass screen.

# 2.5 THERMOMETERS

- A. Separable socket, inserted into fluid flow, adjustable, hermetically sealed, red or blue indicating fluid, non-toxic, die-cast, baked enamel finish, double strength glass lens, white scale and black graduations.
- B. Scale: Heating Water 30 deg. to 240 deg. F Chilled Water - 0 deg. to 100 deg. F
- C. Manufacturer: U.S. Gauge, H.O. Trerice, Moeller, Duro, Miljoco Corp., Winter Instruments.

# 2.6 GAUGES

A. Phosphor bronze bourdon tube, polypropylene case, gasketed glass crystal, aluminum dial, black graduations 4-1/2 inch diameter.

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- B. Range: 0 to 60 psi, 5 pound intervals, 1/2 pound graduations.
- C. Manufacturers: Danton, U.S. Gauge, H.O. Trerice, Moeller, Miljoco Corp., Winter Instruments, Weksler Instruments.
- D. Install with bronze gauge cock.
- 2.7 TEST STATIONS PRESSURE/TEMPERATURE
  - A. Provide a SISCO 1/4" or 1/2" NPT fitting (Test Plug) of solid brass at desired indicated locations. Test plug shall be capable of receiving either a pressure or temperature probe 1/8" o.d. Dual seal core shall be neoprene for temperature to 200 degrees F. Nordel to 350 degrees F and shall be rated zero leakage from vacuum to 1000 psig. P/T plug to have grooved cap and chain.
  - B. P/T plugs shall be provided with extensions as required by insulation.
  - C. Mechanical Contractor shall also provide the following: pressure gauge adapters with 1/8" o.d. probe, 5" stem pocket testing thermometers for 25° to 125° F (tower and chilled water) for 0° to 220° F (hot water) for 50° - 500° F (temperatures above 220° F).
  - D. One (1) Master Test Kit shall be furnished to the Owners. Kit shall contain one (1) 2-1/2" test gauge of suitable range, one (1) Gauge Adapter 1/8" o.d. probe, and 5" stem pocket testing thermometers one (1)  $0^{\circ}$  220° F and one (1) 50° 550° F.
  - E. Manufacturer: Sisco P/T Plugs.
- 2.8 ISOLATING FITTINGS
  - A. Provide isolating fittings between all sections of dissimilar piping materials or piping and equipment where one material is ferrous and the other is non-ferrous.
  - B. Manufacturer: Epco Sales, Inc., or insulated unions by Central Plastic Co.
- 2.9 PIPE SADDLES
  - A. Steel pipe saddles shall be welded to all black ferrous pipe, 2-1/2" pipe size and larger, at hanger locations, for systems of steam, hot water and other heat conveying systems.
  - B. Steel pipe saddles shall be welded to all black ferrous hot piping at the pipe support location when roll type hangers or pipe roll supports are employed.
  - C. The saddles shall be packed with plastic insulating cement, and the saddle shall finish flush with the surface of the specified insulation.
- 2.10 UNIONS
  - A. Up to and including 2 inch pipe size: Screwed pattern, bronze-to- bronze seat.

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- B. Above 2 inch pipe size: Flanged pattern, A.S.A. forged steel, with gaskets, bolts and nuts.
- C. Copper tubing unions shall have sweated type ends. Flanged unions on copper tubing may be soldered connections.
- D. Materials and pressure ratings shall be the same as specified for the respective pipe and fitting system unless otherwise specified.
- 2.11 MOTORS
  - A. All single phase and polyphase motors shall be manufactured to incorporate the latest NEMA standards.
  - B. All single phase and polyphase motors shall have steel frames with ball bearings and copper windings. All motors to have a Class "F" insulation system with a service factor of 1.15.
  - C. All motors shall be 1725 RPM, 4 pole design, unless otherwise noted on the drawings, or in the equipment specifications.
  - D. Motors installed indoors and not exposed to moisture shall be open, dripproof, Class B temperature rise based on 40 deg. C maximum ambient temperature.
  - E. Motors installed outdoors and exposed to moisture shall be totally enclosed, fan cooled, Class B temperature rise based on 40 deg. C maximum ambient temperature.
  - F. Based on NEMA Standards, motors shall comply with the following minimum nominal efficiencies at full load.

| Nominal Efficiencies for "NEMA Premium <sup>TM</sup> ", Induction Motors<br>Rated 600 Volts or Less (Random Wound) |                 |          |          |                             |          |          |
|--|-----------------|----------|----------|-----------------------------|----------|----------|
|  | Open Drip-Proof |          |          | Totally Enclosed Fan-Cooled |          |          |
| HP   | 3500 RPM        | 1800 RPM | 1200 RPM | 3500 RPM                    | 1800 RPM | 1200 RPM |
| 1  | 82.5            | 85.5     | 77.0     | 82.5                        | 85.5     | 77.0     |
| 1.5  | 86.5            | 86.5     | 84.0     | 87.5                        | 86.5     | 84.0     |
| 2  | 87.5            | 86.5     | 85.5     | 88.5                        | 86.5     | 85.5     |
| 3  | 88.5            | 89.5     | 85.5     | 89.5                        | 89.5     | 86.5     |
| 5  | 89.5            | 89.5     | 86.5     | 89.5                        | 89.5     | 88.5     |
| 7.5  | 90.2            | 91.0     | 88.5     | 91.0                        | 91.7     | 89.5     |
| 10   | 91.7            | 91.7     | 89.5     | 91.0                        | 91.7     | 90.2     |
| 15   | 91.7            | 93.0     | 90.2     | 91.7                        | 92.4     | 91.0     |
| 20   | 92.4            | 93.0     | 91.0     | 91.7                        | 93.0     | 91.0     |
| 25   | 93.0            | 93.6     | 91.7     | 93.0                        | 93.6     | 91.7     |

G. Motor Characteristics: Refer to Equipment Schedules for specific data.

- H. All motors rated less than 1/2HP shall have thermal protection of the auto-reset type as an integral part of the motor.
- I. All motors rated 1/2HP and larger shall have thermal protection provided by an external device.
- J. Whenever a variable frequency PWM drive is installed to control an AC motor, a maintenance-free, circumferential, conductive micro fiber shaft grounding ring shall be installed on the AC motor drive end to discharge shaft currents to ground. Recommended part: AEGIS SGR<sup>TM</sup> Bearing Protection Ring, as made by Electro Static Technology. Install in accordance with the manufacturer's written instructions.

### PART 3 – EXECUTION

### 3.1 PIPING SYSTEMS

- A. All piping to drain to low points. Low points shall be provided with drain valves with hose thread.
- B. All piping shall be arranged to have air vents at high points.
  - 1. Air vents shall be automatic in operation when located in Boiler Rooms, Chiller Rooms and Mechanical Equipment Rooms. All air vents shall be provided with a PVC drain line which shall be routed to the nearest floor drain. Several air vents may be tied together.
  - 2. Air vents shall be manual in operation in all other locations.
- C. Do not install trapped lines where water cannot be drained or air can accumulate without being vented.
- D. Piping shall run square with building lines.
- E. Piping shall not be insulated or covered until tested.
- F. Necessary drains, off-sets, vents and drips shall be provided for coordination of the work as part of the contract.
- G. Running or close nipples are not permitted.
- H. Piping shall not be installed over electrical transformers, panels, switchgear, substations, and control panels. No piping shall be installed in elevator machine rooms.
- I. Exposed insulated piping risers in unfinished spaces shall be covered with 22 gauge galvanized steel sleeves from floor to ceiling. Refer to Section: Insulation & Covering HVAC for additional requirements.
- J. Allow clearance for expansion and contraction.
- K. Install eccentric piping fittings where change in sizes occurs in piping systems. Tops of pipes to remain level.

- L. Install isolating fittings between sections of ferrous and non-ferrous pipe or connected equipment.
- M. Do not support piping from other piping, conduits or equipment.
- N. Strainers shall be installed on suction of all pumps, inlets of control valves, and where indicated on drawings.
- O. Thermometers and gauges shall be installed where indicated on the drawings, required by equipment specifications and where indicated elsewhere in the specifications.
- P. Flexible connectors shall be provided on suction and discharge piping of all base mounted pumps.
- Q. Unions shall be provided adjacent to all valves, at equipment connections, and where necessary to facilitate dismantling of the piping system.
- R. Install expansion joints, expansion compensators, anchors and guides in piping systems as shown on the drawings and in accordance with manufacturer's written instructions.
  - 1. Provide anchors and guides on both sides of the expansion compensator or expansion joint in accordance with EJMA Standards.
  - 2. Provide anchors and moment guides in each pipe, with the first moment guide located the equivalent of four-pipe diameters from the compensator, and the second guide fourteen pipe diameters beyond the first guide.
  - 3. Remove all shipping blocks, stays, setscrews, etc., from all compensators and moment guides. Pipe centerlines shall be aligned.
  - 4. During initial system pressurization, all pipe guides and anchors must be secure and functioning.
- S. Material Requirements for Systems:
  - 1. Heating Hot Water Supply & Return Piping:
    - a. Schedule 40 black steel.
    - b. Type L hard copper.
    - c. Grooved End black steel.
  - 2. Chilled Water Supply & Return Piping:
    - a. Schedule 40 black steel.
    - b. Type L hard copper.
    - c. Grooved End black steel.
  - 3. AC Condensate Drain (including pumped condensate):
    - a. Type DWV copper.
    - b. Schedule 40 PVC.

### 3.2 TAGS, CHARTS AND IDENTIFICATION

- A. See Paragraph "Labeling" in GENERAL PROVISIONS for equipment labeling.
- B. Identify each valve in all systems with black, numbered and stamped 1- 1/2" brass or aluminum tags fastened to valve by brass chain and S-hook.
- C. Provide 1/8" scale diagrams showing location, number and service or function of each tagged item.
  - 1. Frame diagrams in approved metal frames with clear acrylic front, hinges, and locks.
  - 2. Secure to wall in Mechanical Room.
  - 3. Provide two additional separate copies permanently covered and bound.
    - a. Include one (1) copy in the Operation and Maintenance Manuals.
- D. Piping Identification: Identify piping with Seton "Setmark" or Brimar, semi-rigid plastic, wraparound pipe markers with flow arrows and conforming to ANSI A13.1. Locate marker at each valve, changes in direction, where pipes pass thru barriers and every 25' of horizontal runs. Lettering on background shall be in accordance with the following colors:

| Legend |                      | Background | Lettering |
|--------|----------------------|------------|-----------|
| 1.     | Chilled Water Supply | - Green    | - White   |
| 2.     | Chilled Water Return | - Green    | - White   |
| 3.     | Gas                  | - Yellow   | - Black   |
| 4.     | Heating Water Supply | - Yellow   | - Black   |
| 5.     | Heating Water Return | - Yellow   | - Black   |

E. Provide color coded 1" diameter markers on ceiling tile grids to indicate system and valve locations.

| Chilled Water: | - Blue |
|----------------|--------|
| Hot Water:     | - Red  |

F. Manufacturers: Seton "Setmark", Brimar, B-Line MSI.

# 3.3 WELDING

- A. All concealed and inaccessible black steel piping shall be welded.
- B. All black steel piping larger than 1-1/4 inch may be fusion welded.
- C. All elbows, tees and branch connections shall be made with welding fittings ANSI B16.9.
- D. Welding shall be in accordance with the ASME Boiler and Pressure Vessel Code Section IX.
- E. Furnish welder test certificate for review. Certificates of successful qualification by the following organizations shall be acceptable.

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- 1. ASME Boiler and Pressure Vessel Code
- 2. ANSI Code for Pressure Piping
- 3. National Certified Pipe Welding Bureau
- 4. Military Specification MIL-STD-248

### 3.4 SOLDERING/BRAZING

- A. Connections between copper tubing and copper fittings shall be made with the appropriate filler metal. Flux shall be non-corrosive type as recommended by the manufacturer of the filler metal, and conforming to AWS A5.8.
- B. Tubing shall be cut square and then reamed and deburred. End of tubing and inside of fitting cup shall be cleaned with steel wool and the flux shall be applied to the clean surface before joining. After joining, the excess filler metal shall be wiped off while still plastic.
- C. Silver brazing alloy shall be equal to Easy-Flo by Handy and Harmon or Sta-Brite silver solder and shall be used for joints in:
  - 1. Hot water heating piping
  - 2. Chilled water piping
- D. Where the silver brazing is performed in a confined non-ventilated space, a non-toxic, cadmium-free brazing alloy such as braze 560 by Handy & Harman shall be used.
- E. Refrigerant piping shall be silver brazed using Harris Sil-Fos 15 or equivalent, with nitrogen purge.
- F. Bring joint to solder temperature or brazing temperature in as short a time as possible.
- G. Form continuous solder bead or brazing filler bead around entire circumference of joint.
- H. Wipe excess solder from joint area while solder is still plastic.

END OF SECTION 230210

### SECTION 230215: VALVES

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
  - B. Refer to Section 230200 for HVAC General Provisions.
  - C. Refer to other sections in Division 23 for materials and methods not specified herein.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes the following:
    - 1. General
    - 2. Chilled Water Systems
    - 3. Hot Water Heating System

### 1.3 QUALITY ASSURANCE

- A. Provide adequate supervision of labor force to assure that all aspects of the specifications are being fulfilled.
- B. Verify that all work and equipment is installed in accordance with manufacturer's warranty requirements.

## PART 2 – PRODUCTS

- 2.1 GENERAL
  - A. All gate and globe valves shall be designed for repacking under pressure when fully opened, and shall be equipped with packing suitable for the intended service. When the valve is fully opened, the back seat shall protect the packing and the stem threads from the fluid. All gate and globe valves shall have a gland follower. The pressure- temperature rating of valves shall be not less than the design criteria applicable to all components of the system.
  - B. Insofar as possible, all valves of the same type shall be of the same manufacture.
  - C. All valves shall be provided with stem extensions. Valve handle shall be clear of insulation jacket.
  - D. Manufacturers:

Stockham Milwaukee Hammond Apollo Watts Walworth Nibco Jamesbury

# 2.2 CHILLED WATER SYSTEMS

A. Gate Valves - 2" and smaller:

Valves 2" and smaller shall be of Class 125, body and bonnet shall be of ASTM-B-62 cast bronze composition, threaded or solder ends, solid disc, copper-silicon alloy stem, brass packing gland, Teflon- impregnated packing and malleable handwheel.

Recommended Valves:

| Threaded:  | D 100 (D | <b>C</b> ) | Solder:    | 0 100 (D | (C)   |
|------------|----------|------------|------------|----------|-------|
| Stockham E | 6-100 (R | .5)        | Stockham I | 3-108 (R | (2)   |
| or         |          | or         |            |          |       |
| Stockham E | 8-103 (N | RS)        | Stockham H | 3-104 (N | IRS)  |
|            |          |            |            |          |       |
|            | RS       | NRS        |            | RS       | NRS   |
|            |          |            |            |          |       |
| Hammond    | IB690    | IB609      | Nibco      | S111     | S113  |
| Milwaukee  | 148      | 105        | Hammond    | IB691    | IB613 |

B. Gate Valves - 2-1/2" and Larger:

Valves 2-1/2" and larger shall be Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A-126 Class B cast iron, flanged ends with Teflon-impregnated packing and two-piece packing gland assembly.

Recommended valves:

Stockham G-623 OS&Y RS Stockham G-612 NRS

|         | OS&Y   | NRS     |
|---------|--------|---------|
| Hammond | IR1140 |         |
| Nibco   | F617-0 | F639-31 |

C. Ball Valves - 3" and Smaller:

Valves 3" and smaller shall be 600 psi CWP, have cast brass bodies, replaceable reinforced Teflon seats, conventional port, blowout proof stems, chrome plated brass ball, and threaded or solder ends. Provide extended valve handle to accommodate up to 2" of insulation with non-thermal conductive material, insulation plug, cap and protective sleeve.

Recommended valves:

| Threaded:            | Solder:              |
|----------------------|----------------------|
| Stockham S-216-BR-RT | Stockham S-216-BR-RS |
| NIBCO T-580-70BR     | NIBCO S-580-70BR-R   |
| Jamesbury II 1100TT  |                      |
| Apollo 70-100        | Apollo 70-200        |
| Inline 334           |                      |

Alternative is Stockham S-217-BR-RT (threaded).

Drain valves, <sup>1</sup>/<sub>2</sub>" or <sup>3</sup>/<sub>4</sub>" shall be 600 psi CWP, with stainless steel trim, cast bronze body, 2-piece with cap and chain, full port stainless steel ball and stem, RTFE ball seat, threaded or soldered inlet connection, cap rated for 150 psi.

Recommended valve:

Stockham S-285-BR-R-66-HC.

D. Globe Valves - 2" and Smaller:

Valves 2" and smaller shall be of Class 125, body and bonnet of ASTM B-62 cast bronze composition, threaded or soldered ends, copper silicon alloy stem, brass packing gland, Teflon-impregnated packing, and malleable handwheel.

Recommended valves:

| Threaded:      | Solder:        |
|----------------|----------------|
| Stockham B-13T | Stockham B-14T |
| (Teflon Disc)  | (Teflon Disc)  |
| Stockham B-16  | Stockham B-17  |
| (Bronze Disc)  | (Bronze Disc)  |
| Nibco T211B    | Jenkins 1200   |
| Hammond IB440  | Nibco S211Y    |

E. Globe Valves - 2-1/2" and Larger:

Valves 2-1/2" and larger shall be Class 125 iron body, bronze mounted with body and bonnet conforming to ASTM A-126 Class B cast iron, flanged ends, with Teflon-impregnated packing and two-piece packing gland assembly.

Recommended valves:

Stockham G-512 (Bronze disc) Stockham G-514T (Teflon disc)

| Bronze Disc:  | Comp. Disc.: |
|---------------|--------------|
| Hammond IR116 |              |
| Nibco F718B   |              |

F. Check Valves - 2" and Smaller:

Valves 2" and smaller shall be of Class 125, threaded or solder ends, body and caps shall be ASTM B-62 cast bronze composition, swing type disc.

Recommended valves:

| Threaded:      | Solder:        |
|----------------|----------------|
| Stockham B-319 | Stockham B-309 |
| Hammond IB490  | IB941          |
| Milwaukee 509  | 1509           |

If composition disc is preferred, specify Stockham B-320B - threaded end, or B-310B - solder end, for Class 125 service.

G. Check Valves - 2-1/2 and Larger:

Valves 2-1/2" and larger shall be iron body, bronze mounted with body and cap conforming to ASTM A-126 Class B cast iron, flanged ends, swing type disc.

Recommended valves:

Stockham G-931

Hammond IR1124 Milwaukee F2974

### 2.3 HOT WATER HEATING SYSTEM

A. Gate Valves - 2" and smaller:

Valves 2" and smaller shall be of Class 150 with body and union bonnet of ASTM B-62 cast bronze composition, threaded or solder ends, solid disc, copper-silicon stem, brass packing gland, Teflon- impregnated packing, and malleable handwheel.

Recommended valves:

| Threaded:<br>Stockham B-120 (RS)<br>Stockham B-130 (RS) | Solder:<br>Stockham B-124 |
|---|---------------------------|
| Hammond IB629   | IB648                     |
| Nibco T134  | S134                      |

B. Ball Valves - 3" and smaller:

Valves 3" and smaller shall be 600 psi CWP, have cast brass bodies, replaceable reinforced Teflon seats, conventional port, blowout proof stems, chrome plated brass ball, and threaded or solder ends with extended solder cups. Provide extended valve handle to accommodate up to 2" of insulation with non-thermal conductive material, insulation plug, cap and protective sleeve.

Recommended valves:

| Solder:              |
|----------------------|
| Stockham S-216-BR-RS |
|                      |
|                      |
|                      |
| Apollo 70-200        |
| S580-70BR-R          |
|                      |
|                      |

Drain valves, <sup>1</sup>/<sub>2</sub>" or <sup>3</sup>/<sub>4</sub>", shall be 600 psi CWP, with stainless steel trim, cast bronze body, 2-piece with cap and chain, full port stainless steel ball and stem, RTFE ball seat, threaded or soldered inlet connection, cap rated for 150 psi.

Recommended valve:

Stockham S-285-BR-R-66-HC

C. Gate Valves - 2-1/2" and larger:

Valves 2-1/2" and larger shall be Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A-126 Class B cast iron, flanged ends, with Teflon-impregnated packing and two-piece packing gland assembly.

Recommended valves:

Stockham G-623 (OS&Y) RS Stockham G-612 (NRS)

|                | OS&Y   | NRS     |
|----------------|--------|---------|
| Nibco          | F618-0 | F639-31 |
| Hammond IR1140 |        |         |

D. Globe Valves - 2" and smaller:

Valves 2" and smaller shall be of Class 150 with body and union bonnet of ASTM B-62 bronze, copper-silicon alloy stem, brass packing gland, Teflon-impregnated packing and malleable handwheel.

Recommended valves:

| Threaded:                   | Solder:                     |
|-----------------------------|-----------------------------|
| Stockham B-22 (Teflon Disc) | Stockham B-24 (Teflon Disc) |

Stockham B-29 (Stainless trim) ----

| Comp. Disc.:  | S.S. Trim:     |  |  |
|---------------|----------------|--|--|
| Nibco T-235-Y | Milwaukee 591A |  |  |

E. Globe Valves - 2-1/2" and Larger:

Valves 2-1/2" and larger shall be Class 125 body, bronze mounted, with body and bonnet conforming to ASTM A-126 Class B cast iron, flanged ends, with Teflon - impregnated packing and two-piece packing gland assembly.

Recommended valves:

Stockham G-512 (bronze disc) Stockham G-514 (Teflon disc)

Hammond IR 116 Nibco F7181B

F. Check Valves - 2" and smaller:

Valves 2" and smaller shall be Class 150 with bodies and caps of ASTM B-62 bronze composition and threaded ends. Class 150 valves shall have lift-type Buna-N-disc and union caps, and are to be used in lines with globe valves.

Recommended valves:

Stockham B-322-B Hammond IB948 Milwaukee 510

For backflow prevention in lines with gate valves, Y-pattern valves with swing-type disc are recommended.

For Class 150 Service, threaded ends:

Stockham B-321

G. Check Valves - 2-1/2" and Larger:

Valves 2" and larger shall be iron body, bronze mounted, with body and cap conforming to ASTM A-126 Class B cast iron, flanged ends, and swing-type disc.

Recommended valves:

Stockham G-931 Hammond IR1124 Nibco F918-B

# PART 3 – EXECUTION

# 3.1 PIPING SYSTEMS

- A. All piping to drain to low points. Low points shall be provided with drain valves with hose thread.
- B. Valve body construction shall match piping system material.
- C. Install isolating fittings between sections of ferrous and non-ferrous pipe or connected equipment.
- D. Valves shall be installed with stems above horizontal.
- E. Valves shall be installed on all sides of equipment and control valves to allow isolation for repair.
- F. Unions shall be provided adjacent to all valves, at equipment connections, and where necessary to facilitate dismantling of the piping system.
- 3.2 TAGS, CHARTS AND IDENTIFICATION
  - A. Identify each valve in all systems in accordance with requirements of Section 230210.

END OF SECTION 230215

### SECTION 230230: INSULATION & COVERING - HVAC

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
  - B. Refer to Section 230200 for HVAC General Provisions
  - C. Refer to Section 230210 for HVAC Basic Materials & Methods.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes insulation and covering provided on the following piping and equipment:
    - 1. Hot Water Heating Piping
    - 2. Chilled Water Piping
    - 3. Condensate Drain Lines
    - 4. Exterior Piping
    - 5. Acoustic Duct Liner
    - 6. Reusable Valve Covers
    - 7. Insulated Pipe Saddles
  - B. Insulation shall be installed on the following duct systems:
    - 1. All supply ductwork.
    - 2. All return ductwork.
    - 3. All ductwork connected to energy recovery units.
- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 230200 for a general description of requirements applying to this section.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 230210 for a general description of requirements applying to this section.
  - B. Install insulation in accordance with manufacturer's recommendations.
  - C. Provide adequate supervision of labor force to assure that all aspects of the specifications are being fulfilled.
- 1.5 SUBMITTALS
  - A. Submit shop drawings, installation instructions, and manufacturer's literature of all materials specified in accordance with Section 230200.

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- B. Submit fabrication instructions for pipe fitting and valve insulation.
- C. Submit manufacturer's joining recommendations for butt joints and longitudinal seams.
- 1.6 WARRANTY/GUARANTEE
  - A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, General Requirements.

## PART 2 – PRODUCTS

- 2.1 PIPE INSULATION MATERIAL
  - A. Fiberglass:
    - 1. Material: Preformed fiberglass bonded with resin to form circular pipe sleeves with factory applied, white all service jacket bonded to reinforced foil vapor barrier jacketing. The jacket shall have factory applied double pressure-sensitive, self-sealing, adhesive closure and vapor sealing of longitudinal joints. Thermal conductivity: 0.24 Btu/Hr./SF/inch at 100 degrees F. Flame spread of 25 and developed smoke of 50 or less.
    - 2. All Valves and Fittings:
      - a. Glass fiber insert and pre-molded PVC cover, Johns Manville Corp. "Zeston" and "Hi-Lo Temp Inserts" for fittings. Glass fiber or prefabricated elastomeric foam fittings must fill the entire space within the cover completely.
      - b. Factory molded fibrous glass fitting covering for fittings. Coat ends with Fosters 30-36 lagfast adhesive
      - c. Mitered sections of pipe covering for valves.
    - 3. Manufacturers: Johns Manville Corp., Certain-Teed, Owens- Corning, Knauf, Armacell.
  - B. Closed Cell:
    - 1. Material: Black flexible elastomeric foamed closed cell structure insulation 25/50 rated with a flame spread rating of 25 or less and a smoke developed rating of 50 or less with both a moisture seal and a reinforced elastic foam lap seal closure system.
    - 2. Flexible pipe insulation shall be a foamed elastomeric closed cell structure material, with a thermal conductivity of not more than 0.27 Btu/Hr./Sq. Ft./Inch at a mean temperature of 75 degrees F. The insulation shall have an average density of at least 2 pounds per cubic foot, shall be self-extinguishing, and shall have a water vapor transmission rating of not more than 0.1 perms. Between temperature limits of -40 degrees F and plus 220 degrees F, the insulation shall not indicate any deviation from its original state.

3. Specification Compliance:

ASTM-E-84 ASTM-C-534 Type I – Tubular, Type II – Sheet. ASTM-D-1056, 2B1 – Tubular, Sheet. MIL-C-3133B (MIL STD 670B) Grade SBE-3 MIL-P-15S280J, Form T, Form S.

- 4. Manufacturers: Armacell, Nomaco, K-Flex.
- C. Covering of Pipe Insulation Outdoors:
  - 1. Wrapping: Wrap insulation with embossed 0.016" aluminum jacket.
  - 2. Fastenings: Cover shall be held in place with soft aluminum bands on 12" centers.
  - 3. Valves and Fittings: Weatherproof all valves and fittings.
- D. Manufacturers: Johns Manville Corp., Certain-Teed, Owens- Corning, Knauf.
- 2.2 DUCT INSULATION
  - A. Concealed Supply, Return, Relief, and Outside Air Ductwork, and all ductwork connected to energy recovery units: Fiberglass duct wrap bonded with resins, 3/4 pound density, aluminum foil facing reinforced with fiberglass scrim, laminated to Kraft, 2" thick.
    - 1. Thermal Conductivity: 0.27 Btu/Hr./SF/Inch at 75 degrees F. Min. installed "R" value w/25% compression shall be 5.6.
    - 2. Duct wrap shall be cut to stretch-out dimensions as provided in manufacturer's instructions. Remove a 2" piece of insulation from the facing at the end of the piece of insulation to form an overlapping staple and tape flap. Install with facing outside so tape flap overlaps insulation and facing at other end. Insulation shall be tightly butted and not compressed excessively at duct corners. Seams shall be stapled 6" on center with outward clinching staples. All seams, tears, punctures and other penetrations of the insulation facing shall be sealed with foil tape or vapor proof mastic. Where rectangular ducts are 24" in width or greater, duct wrap shall be secured to the bottom of the duct with mechanical fasteners; i.e., stick pins spaced 18" on center.
  - B. Exposed supply, return, relief, and outside air ductwork, and all ductwork connected to energy recovery units, shall be insulated in finished conditioned spaces, penthouse, mechanical rooms, mezzanine areas, equipment closets, and non-conditioned spaces with 2" thick rigid fiberglass board. Insulation shall be 6 P.C.F. density with a "K" value of 0.25 Btu/Hr./SF/Inch at 75 degrees F. mean temperature and shall be U.L. listed at 25 maximum for flame spread, and 50 maximum for smoke developed. Insulation shall be applied using Graham Pins or Stik-Clips and all seams, edges and breaks shall be sealed with 4" matching tape and sealed with Vicryl CP-10 to match ASJ jacket. Insulation shall be provided with all-service jacket facing.
  - C. Manufacturers: Johns Manville Corp., Certain-Teed or Owens- Corning, Knauf.

- D. Outdoor Installation:
  - 1. On all outdoor square and rectangular ductwork, provide a minimum 0.032 inch thick plain stucco embossed aluminum jacket over 2 inch thick rigid fiberglass board insulation as described in part B of this article.
    - a. 32-mill aluminum roll jacketing, ASTM B2089, with 2.5 mil poly/surlyn backing, plain or white acrylic coated, as made by Childers, RPR, or Pabco.
  - 2. Provide duct roof pitch-supports at all flanges, stiffeners, insulation joints along the top of the horizontal ducts with 24 inch maximum spacing, with 12 degree pitch and anti-sweat coating.
  - 3. Provide rolled metal jacketing with all seams overlapping 2 inches in a watershed fashion.
  - 4. Apply the roll metal jacketing from 48 inch wide roll stock lengthwise with the duct to minimize the number of seams for ducts that measure 44 inches and less on any side including insulation.
  - 5. Machine break the metal jacketing for sharp corners; on large ducts, cross break the jacket to eliminate wrinkles.
  - 6. Secure seams with stainless steel sheet metal screws 4 inches on center. On horizontal ducts, seal seams on duct horizontal surfaces and on vertical ducts seal the vertical seams with continuous bead of caulking sealant.
    - a. sealer made by Fosters Foamseal 30-45, Childers CP-70, Epolux Cadaseal 745.
  - 7. Flash metal jacket with same material applied to the duct where insulation terminates at bolted flanges. Allow for bolt removal where access or disassembly is required.
  - 8. Manufacturer: Fabrite as made by County Insulation Company, New Castle, Delaware.

# 2.3 ACOUSTIC DUCT LINER

- A. Duct liner shall be designed for use as an acoustical insulation to absorb air conditioning noise in sheet metal ducts and plenums operating at velocities up to 6000 fpm and temperatures up to 250 deg. F.
- B. Duct liner shall be a bonded mat of glass fibers coated with an EPA registered biocide and a black pigmented fire-resistant coating on the air stream side or flexible elastomeric closed cell foam made with an EPA approved anti-microbial.
- C. Duct liner shall comply with the requirements of NFPA 90A and 90B. Surface burning characteristics shall comply with UL Standard 723 for 25/50 flame and smoke development.
- D. Duct liner shall comply with the property requirements of ASTM Specification C1071 Type 1, or ASTM C1534. Material shall resist fungal and bacterial growth when subjected to ASTM G21 and G22 test methods.
- E. Material thickness, name of manufacturer and type shall be printed on the air stream side of the liner for ease of identification.

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- F. Duct liner shall be 2" thick, unless otherwise noted on the drawings.
- G. Manufacturers: Owens Corning QuietR<sup>®</sup> AcousticR<sup>™</sup> Duct Liner, Certainteed, Evonik Industries Solcoustic, Johns Manville Linacoustic<sup>®</sup> RC, Armacell.

### 2.4 REUSABLE VALVE COVERS

- A. All valves, strainers, combination valves, etc. in chilled water and heating hot water systems shall be insulated with a factory fabricated removable and reusable cover. (This product shall not be used for pipe and fittings.)
- B. Insulation shall be either fiberglass blanket or flexible elastomeric thermal insulation as listed in Paragraph 3.2 of this specification, or prefabricated fitting from the supplier. Flame and smoke spread shall be 25/50 per ASTM 84.
- C. Outer jacket shall be made of material equal to Tychem QC, overlap and completely cover the insulation, with seams joined by tabs made from Velcro or fabric straps per manufacturer's standards.
- D. Outer jacket shall overlap adjoining sections of pipe insulation, and shall be non-combustible, impermeable to water, and prevent mold, mildew and condensation.
- E. Installation shall not require the use of any special hand tools.
- F. Manufacturers: Corick Valve Covers, NoSweat Valve Wraps.
- 2.5 INSULATED PIPE SADDLES
  - A. Insulation and facing shall each meet 25/50 flame and smoke ratings per ASTM E-84 on a component basis.
  - B. A section of rigid insulation shall be used at all cold pipe hangers or support locations and shall consist of:
    - 1. A rigid 3.75 PCF phenolic foam pipe insulation designed to support pipe sizes up to and including 6" iron pipe size.
    - 2. A rigid 5 PCF phenolic foam pipe insulation designed to support pipe sizes from 8" to 30" iron pipe size.
    - 3. For all hot pipe hanger or support locations, the insert material shall be either rigid calcium silicate per ASTM C303 or perlite silicate per ASTM C303 with all service jacket and laminated to a steel support saddle.
  - C. The insulation jacket shall contain a vapor retarding material to provide low moisture vapor permeability and resistance to mold, mildew and fungus growth.
  - D. The insulation shall be free of any CFC or HCFC materials.

- E. The insulation shall have a minimum K-factor of 0.13 at 75 deg. F mean temperature, and self-sealing lap joint with high performance acrylic pressure sensitive adhesive tape.
- F. Integral insulation saddle shall be made of G-90 carbon steel, with full 180 deg. Coverage, flared edges to protect the vapor barrier jacket and insulation, and short rib surface to center the saddle inside the hanger and prevent movement.
- G. Preformed insulation shall extend beyond the saddle by a minimum of 1-1/2" to accommodate a tape joint seal at the butt edges of adjoining insulation sections.

| Nominal pipe                        | Insulation | Insulation | Saddle   | Saddle |
|-------------------------------------|------------|------------|----------|--------|
| size                                | density    | length     | length   | gauge  |
| (inches)                            | (PCF)      | (inches)   | (inches) |        |
| <sup>1</sup> / <sub>2</sub> - 3-1/2 | 3.75       | 9          | 6        | 20     |
| 4 – 6                               | 3.75       | 12         | 9        | 18     |
| 8 – 18                              | 5.0        | 18         | 12       | 16     |
| 20 - 30                             | 5.0        | 24         | 18       | 14     |

H. Minimum product dimensions shall be as follows:

I. Manufacturer: Tru-Balance insulated saddles as made by Buckaroos, Inc.

## PART 3 - EXECUTION

- 3.1 INSTALLATION GENERAL
  - A. Do not install until systems have been tested and meet requirements.
  - B. Heavy work which may damage insulation shall have been completed in the vicinity of the insulation work.
  - C. Provide non-compressible insulation saddles at all piping hanger locations, and at all piping hanger locations where piping is insulated with flexible closed cell insulation.

Option: Provide insulation coupling system as made by Klo-Shure Co.

- D. All installations shall be made by skilled craftsmen regularly engaged in this type of work.
- E. Insulation shall be continuous thru-wall, ceiling and floors.
- F. Metal shields, 16 gauge galvanized, shall be installed between hangers and pipe insulation.
- G. Pipe, ductwork and equipment shall be clean and dry prior to insulating.
- H. Install all insulation per manufacturer's instructions.
- I. To avoid undue compression of insulation, provide solid core inserts at all supports as recommended by the insulation manufacturer. Provide insulation shields between the insulation jacket and the hanger.

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- J. Ductwork treated with one inch thick internal acoustic duct liner requires one inch thick fiberglass external insulation.
- K. Apply vapor proof mastic as recommended by the insulation manufacturer on all longitudinal and butt joints of sectional pipe insulation. Apply similar mastic to the end of every third length of sectional pipe insulation on all chilled water and dual temperature pipe insulation to prevent the migration of condensation that might occur.
- 3.2 PIPE INSULATION TYPES & THICKNESSES
  - A. Provide fiberglass insulation of thickness specified on:
    - 1. Heating Hot Water: (Up to 200°F)

1-1/2" for piping 1-1/2" and below 2" for pipes 2" and over.

2. Chilled Water:

1-1/2" for piping 2" and over.

- 3. Freeze protection of outdoor piping (over heat tracing tape): 3" thick insulation, with metal jacket.
  - a. HVAC: Chilled water and condenser water piping designated on the drawings.
  - b. Plumbing: Cold water make-up to cooling tower.
  - c. Equipment drain piping.

### 3.3 PIPE COVERING (FOAMED PLASTIC TYPE)

A. All joints and seams shall be sealed with a compatible adhesive. Approved adhesives are as follows:

Armstrong World IndustriesNo. 520Benjamin Foster CompanyNo. 85-75 up to 200 degrees F.

Contractor may use Armstrong Self-Seal Armaflex 2000 insulation in lieu of the above wherever 1/2" is specified.

- B. Fitting covers shall be fabricated from the foamed plastic pipe insulation or from sheet insulation of the identical material. The fabrication shall be in accordance with manufacturer's instructions, and all seams mitered joints shall be joined using the adhesives described hereinbefore.
- C. Pipe insulation in concealed spaces shall require no finish coatings.
- D. Pipe insulation in all other areas shall receive two coats of finish of color selected by Architect. Approved finishes are as follows:

Armstrong World Industries WB Armaflex Finish

# **INSULATION & COVERING – HVAC**

# 3.4 EXTERIOR PIPE COVERING

- A. Wrapping: Wrap insulation with embossed 0.016" aluminum jacket, orient seam down.
- B. Fastenings: Cover shall be held in place with soft aluminum bands on 12" centers.
- C. Valves and Fittings:
  - 1. Weatherproof all valves and fittings.
  - 2. Finish: Apply two coats of vapor resistant mastic reinforced with glass fabric over wrapping.

# 3.5 INTERIOR PIPE COVERING

- A. Provide premolded PVC cover on all interior insulated piping exposed in finished spaces. Orient seams up in overhead piping and toward the wall in vertical runs.
- B. Provide factory molded fitting covering for fittings and accessories, sealed and held in place by manufacturer's recommended sealing system.
- C. Provide mitered sections of covering for valves.

### 3.6 ACOUSTIC DUCT LINER

- A. All portions of duct designated on the drawings to receive duct liner shall be completely covered with duct liner, adhered to the sheet metal with a 100% coverage of adhesive complying with ASTM C916.
- B. Transverse joints shall be neatly butted and there shall be no interruptions or gaps. All transverse joints and all exposed leading edges shall be coated. The black coated surface of the duct liner shall face the airstream.
- C. Duct liner shall be secured with mechanical fasteners which shall compress the duct liner sufficiently to hold it firmly in place.
- D. Duct liner shall be cut to assure overlapped and compressed longitudinal joints.
- E. After installation is complete, blow out the duct system prior to operation to remove any cutting scraps and foreign material remaining in the duct.
- 3.7 INSULATED PIPE SADDLES
  - A. Insulated pipe saddles shall be installed at all hangers, rollers or supports in accordance with manufacturer's written instructions.
  - B. All piping shall be clean and free of oil, rust and moisture prior to and during support installation.
  - C. All insulated saddles and accessories shall be stored in a dry area protected from weather before and during installation

D. Seal adjoining butt edges of pipe insulation with approved mastic and tape to insure continuity of the insulation jacket and vapor barrier, especially on cold piping system installations.

END OF SECTION 230230

## SECTION 230300: VIBRATION AND SOUND ISOLATION – HVAC

### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
  - B. Refer to Section 230200 for HVAC General Provisions
  - C. Refer to Section 230210 for HVAC Basic Materials & Methods.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes providing the following vibration and sound isolation material on items furnished and installed under HVAC work:
    - 1. Rooftop AHU's
    - 2. Ductwork and equipment
- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 230200 for a general description of requirements applying to this section.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 230210 for a general description of requirements applying to this section.
- 1.5 SUBMITTALS
  - A. Submit shop drawings, installation instructions, and manufacturer's literature of all materials specified in accordance with Section 230200.
  - B. Submit the following:
    - 1. Shop drawings
    - 2. Product data
- 1.6 WARRANTY/GUARANTEE
  - A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, General Requirements.

## PART 2 – PRODUCTS

### 2.1 GENERAL

- A. All vibration control apparatus shall be furnished by a single recognized manufacturer. The manufacturer shall submit to the Architect/Engineer evidence affirming that he has been a supplier of vibration control devices of the type required for the past five years.
- B. The vibration control apparatus manufacturer shall supervise, inspect, measure, and approve the installation and shall submit a report to the Architect/Engineer substantiating that all the equipment has been adequately isolated.
- C. Any requests for changes in the specifications must be submitted in writing in time for review and approval through a written addendum to the specifications prior to bid closing.
- D. Unless otherwise indicated or specified, all equipment mounted on vibration isolator bases shall have a minimum operating clearance of 1 inch between the base and the floor or housekeeping and beneath. Clearance space shall be checked to insure that no scrap, rubbish, hardware, etc., has been left to possibly short circuit isolated base.
- E. In connecting isolated HVAC equipment to rest of system, care must be exercised to insure proper installation.
  - Equipment connected to water piping shall be erected on isolators or isolated foundations to correct operating height prior to making piping connections to avoid misalignment problems. To facilitate this, equipment shall be blocked-up with temporary shims to final operating height. When full load is assembled and water is in system, isolators shall then be adjusted to take up load just enough to allow removal of shims.
  - 2. Air handling equipment such as centrifugal fans shall be erected on isolators and leveled with fan operating before flexible duct connection is made. Insure that duct position is in proper alignment and providing proper clearance in proportion to flexible duct connector length. When fan is shut off, misalignment with ductwork is allowable providing it does not strain or damage flexible duct connector. In cases of high static pressure, fans requiring position stabilizers are to be adjusted when fan is operating to achieve the results as described above with isolator adjustment.
- F. Vibration isolator sizes and location shall be determined by the vibration control products manufacturer or as specified herein.
- G. Model numbers of Amber/Booth Co., are given for identification. Products of specified manufacturers will be acceptable, provided they comply with all of the requirements of this specification.

#### 2.2 ISOLATOR TYPES

- A. Rooftop AHU's:
  - 1. Type RTIR: Provide an extruded aluminum rail base for rooftop air conditioning units consisting of a pair of weatherproofed aluminum rails for fastening to equipment and to roof curb incorporating wind restraints and a continuous air and water seal which is protected from accidental puncture and direct sunlight by an aluminum weather shield. Rails shall incorporate non-adjustable Type SW spring isolators properly spaced around perimeter and sized for 1" deflection. To prevent leaks, rails shall be factory assembled (to the limits of freight carriers) and shipped as a one- piece unit.
- B. Ductwork and Equipment Lagging:
  - 1. The barrier shall be constructed of 0.10" thick barium sulphate loaded limp vinyl sheet bonded to a thin layer of reinforced aluminum foil on one side.
  - 2. The barrier shall have a nominal density of 1 psf and shall have a minimum STC rating of 28.
  - 3. The barrier shall exhibit minimum flammability ratings of 0.0 seconds for flame out and after glow and 0.2 inches for char length when tested in accordance with Federal Test Standard No. 191-5903.
  - 4. The barrier shall have a minimum thermal conductivity "K" value of 0.29 and a rated service temperature range of 40°F to 220°F. When tested for Surface Burning Characteristics per ASTM E84, the barrier will have a flame spread index of no more than 10 and a smoke development index of no more than 40.
  - 5. The decoupling layer shall be a combination of 1", 2" fiberglass batting, non-woven porous scrim-coated glass cloth, quilted together in a matrix of 4" diamond stitch pattern which encapsulates the glass fibers. The barrier shall be Type KNM-100-ALQ-1 or 2 and the decoupling layer shall be type KFA by Kinetics. The composite material shall be fabricated to include a nominal 6" wide barrier overlap tab extending beyond the quilted fiberglass to facilitate a leak-tight seal around field joints. Nominal barrier width 54", nominal decoupler width 48".

|                 | Frequenc | y, Hz |     |      |      |      |     |
|-----------------|----------|-------|-----|------|------|------|-----|
| Product         | 125      | 250   | 500 | 1000 | 2000 | 4000 | STC |
| KNM<br>100ALQ-1 | 13       | 16    | 24  | 33   | 43   | 49   | 28  |
| KNM<br>100ALQ-2 | 11       | 16    | 26  | 35   | 44   | 49   | 28  |

6. Sound Transmission Loss: Tested as a free hanging barrier (ASTM E-90-90)

C. Manufacturers: Amber/Booth, Kinetics Noise Control, Mason Industries, Vibration Mounting & Controls, Vibration Eliminator, Inc., Vibro-Acoustics.

## PART 3 – EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's specifications and instructions.
  - 1. No metal-to-metal contact will be permitted between fixed and floating parts.
  - 2. Connections to Equipment: Allow for deflections equal to or greater than equipment deflections. Electrical, drain, piping connections, and other items made to rotating or reciprocating equipment (pumps, compressors, etc.) which rests on vibration isolators, shall be isolated from building structure for first three hangers or supports.
  - 3. Common Foundation: Mount each electric motor on same foundation as driven machine. Hold driving motor and driven machine in positive rigid alignment with provision for adjusting motor alignment and belt tension. Bases shall be level throughout length and width. Provide shims to facilitate pipe connections, leveling and bolting.
    - a. Field cut and apply the insulation decoupler to the outside of the duct. Obtain a uniform thickness by butting all seams together (do not overlap). At elbows or similar transitions, field measure and miter cut the insulation to fit. Ensure that the insulation is not compressed by the fastener used, if any.
    - b. Wrap the noise barrier around the equipment housing or insulation-wrapped duct. At all seams, overlap the barrier by a minimum of 2" and adhere using adhesive. Alternately, the barrier can be butted together at joints with the seam covered by a 2" (50 mm) wide cut piece of the barrier material. This strip is then adhered to the barrier on either side of the seam using adhesive.
    - c. If desired, metal or nylon bands can be wrapped around the outside of the barrier to guard against the potential of adhesive failure. If used, this banding should be placed on either side of all radial seams in addition to the midpoint on longer sections. Ensure that the banding is snug only and does not result in compression of the insulation decoupler beneath.
    - d. In lieu of banding, insulation "stick pins" can be used to reinforce the seams in the noise barrier. Ensure that the pin does not compress the insulation or barrier material beneath.
- B. Inspection and Adjustments: Check for vibration and noise transmission through connections, piping, ductwork, foundations, and walls. Adjust, repair or replace isolators as required to reduce vibration and noise transmissions to specified levels.

## END OF SECTION 230300

## SECTION 230500: PIPING SYSTEMS & ACCESSORIES - HVAC

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
  - B. Refer to Section 230200 for HVAC General Provisions
  - C. Refer to Section 230210 for HVAC Basic Materials & Methods.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes the following equipment:
    - 1. Balancing Valves
    - 2. Combination Valve Package for Pumps
- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 230200 for a general description of requirements applying to this section.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 230210 for a general description of requirements applying to this Section.
  - B. Whenever a variable frequency PWM drive is installed to control an AC motor, a maintenance-free, circumferential, conductive micro fiber shaft grounding ring shall be installed on the AC motor drive end to discharge shaft currents to ground. Recommended part: AEGIS SGR<sup>TM</sup> Bearing Protection Ring, as made by Electro Static Technology. Install in accordance with the manufacturer's written instructions.

## 1.5 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 230200.
- B. Submit the following:
  - 1. Shop Drawings
  - 2. Manufacturers Product Data
  - 3. Test Reports on Piping System Tests

# 1.6 SUBSTITUTIONS

A. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents. This shall include, but not be limited to, space requirements, code clearances, the type, horsepower, capacities, number

# PIPING SYSTEMS & ACCESSORIES - HVAC

and size of services required from other trades, including all required ancillary items furnished and installed by other trades. If the manufacturer or related bidding contractor does not comply with these requirements, this Contractor shall be responsible for any and all additional costs associated with the changes required by other trades.

- 1.7 WARRANTY/GUARANTEE
  - A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, General Requirements.

# PART 2 – PRODUCTS

- 2.1 BALANCING VALVES
  - A. Balancing valves shall be installed where indicated.
  - B. Provide, as shown on the plans, balancing valves with provision for connecting a portable differential (Ft. of Head) pressure meter. Each meter connection shall have pressure/temperature readout ports.
  - C. The balancing valves shall be either a bronze body/brass ball valve, or a Y-pattern globe valve style design and all metal parts of non-ferrous, pressure die-cast, nonporous Ametal copper alloy. Each valve can be installed in any direction without affecting flow measurement and shall provide four (4) functions:
    - 1. Precise flow measurement
    - 2. Precision flow balancing
    - 3. Positive shut-off with no drop seat and teflon disc
    - 4. Drain port suitable for hose bib fitting.
  - D. The valves shall have four (4) 360 deg. adjustment turns of handwheel for maximum setting with hidden memory feature to program the valve with precision tamperproof balancing setting.
  - E. Design Pressure/Temperature:

1/2" - 3" NPT connections 300 psig at 250 deg. F.
1/2" and 3/4" sweat connections 200 psig at 250 deg. F.
2" - 4" flanged or grooved connections 250 psig at 250 deg. F
4" flanged connections 175 psig at 250 deg. F.

- F. Flow sensor: For installation in piping 5" and larger, a precision wafer type orifice insert installed between standard 125 psi at 250 deg. F ANSI flanges to monitor system flow; cast iron body with integral brass EPT check valves to accommodate a differential pressure meter; furnish with calibrated nameplate with flow range through a range of differential head pressures; provide globe valve at each sensor to adjust flow to design conditions.
- G. Manufacturers: Tour & Andersson, Armstrong, Bell & Gossett, Nexus Valve, Taco, Victaulic, Wheatley.

- A. Furnish and install, as shown on the plans, Balancing Valves with provisions for connecting a portable differential (Ft. of Head) pressure meter. Each meter shall have pressure/temperature probes.
- B. The balancing valves shall be Y-pattern globe style design and all metal parts of nonferrous, pressure die cast, nonporous Ametal. Each valve shall provide four (4) functions:
  - 1. Precise flow measurement
  - 2. Precision flow balancing
  - 3. Positive shut-off with no drip seat, eliminating the need of as additional isolation valve
  - 4. Drain connection using <sup>3</sup>/<sub>4</sub>" NPT hose end thread
- C. These valves shall have four (4) 360° adjustment turns of the handwheel for precise setting with hidden memory to provide a tamper-proof balancing setting. Handwheel shall have digital readout. The handwheel can be installed in any position without affecting performance.
- D. Connections shall be <sup>1</sup>/<sub>2</sub>" to 2" NPT or solder end
- E. Manufacturers: Armstrong, Tour and Andersson, Wheatley, Nexus Valve, Vitaulic

# OR

- A. Furnish and install, as shown on the plans, balancing valves with provisions for connecting a portable differential (Ft. of Head) pressure meter. Each meter connection shall have pressure / temperature probes.
- B. The balancing valves shall be Y-pattern globe style design with ductile iron body all other wetted parts of nonferrous, pressure die cast Ametal. Each valve shall provide (3) functions:
  - 1. Precision flow measurement
  - 2. Precision flow balancing
  - 3. Shut-off feature, eliminating the need of an additional isolation valve
- C. These valves shall have eight (8), twelve (12), sixteen (16), twenty (20) or twenty-two (22) 360° adjustment turns of the handwheel for precise setting with hidden memory feature to program the valve with precision tamper-proof balancing setting. Handwheel shall have digital readout. The handwheel can be installed in any position without affecting performance.
- D. Connections shall be  $2\frac{1}{2}$ " and larger flanged or grooved ends.
- E. Manufacturers: Armstrong, Tour and Andersson, Wheatley, Nexus Valve, Vitaulic

# PART 3 – EXECUTION

## 3.1 BYPASSES

A. Three-valve bypasses shall be provided in piping at main system control valves, at control valves for heat exchangers, domestic hot water generators, central station air handling units, and where indicated on drawings.

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B. The bypasses shall consist of two gate valves and one globe or angle valve. The bypass pipe size shall be at least equal to the control valve size.

# 3.2 PIPING SYSTEM DRAINS

- A. All piping shall be graded or pitched toward drain locations which shall be provided with gate valve unless otherwise indicated on drawings or specified. Individual risers may be drained through removable plugs or caps.
- B. Drain valves shall be provided at all major components in systems including boilers, pumps, heat exchangers, cooling towers, and similar equipment.

# 3.3 ECCENTRIC PIPE FITTINGS

- A. Eccentric pipe fittings shall be furnished and installed in all piping and circulated water piping where a change in pipe size occurs in a horizontal run. In water systems the top of the adjacent pipe sections shall be maintained level.
- 3.4 CHEMICAL CLEANING
  - A. Closed re-circulating systems shall be filled and sufficient detergent and dispersant added to remove all dirt, oil and grease. System shall be circulated for at least 48 hours after which a drain valve at the lowest point shall be opened and allowed to bleed while the system continues to circulate. The automatic make-up valve shall be checked to be sure it is operating. Bleeding shall continue until water runs clear and all detergent is removed. A sample of water shall be tested and if pH exceeds 8.0, draining should be resumed.
  - B. Drain all detergent solution from system piping and equipment to nearest floor drain or indirect waste point connected to the building's sanitary system.

END OF SECTION 230500

## SECTION 230510: WATER TREATMENT (HVAC)

### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provision of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
  - B. Refer to Section 230200 for HVAC General Provisions.
  - C. Refer to Section 230210 for HVAC Basic Materials & Methods.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes labor, material, equipment and supervision to provide a complete water treatment system for the following:
    - 1. Cleaning and treatment of circulating HVAC chilled water system and hot water.
      - a. Cleaning Compounds.
      - b. Chemical Cleaning of New Systems

#### 1.3 REFERENCE STANDARDS

- A. Refer to Section 230200 for a general description of requirements applying to this section.
- B. Requirements established within the portions of the Project Manual titled Division 1, General Requirements, are collectively applicable to the work of this section.
- C. Technical Services: Provide the services of an experienced water treatment chemical engineer or technical representative to direct flushing, cleaning, pre-treatment, training, debugging, and acceptance testing operations; direct and perform chemical limit control during construction period and monitor systems for a period of 12 months after acceptance, including not less than four service calls and written status reports. Minimum service during construction/start-up shall be 8 hours.
- D. Field Quality Control and Certified Laboratory Reports: During the one year guarantee period, the water treatment laboratory shall provide not less than 12 reports based on on-site periodic visits, sample taking and testing, and review with Owner, of water treatment control for the previous period. In addition to field tests, the water treatment laboratory shall provide certified laboratory test reports. These monitoring reports shall assess chemical treatment accuracy, scale formation, fouling and corrosion control, and shall contain instructions for the correction of any out-of-control condition.
- E. Log Forms: Provide one year supply of preprinted water treatment test log forms.

# 1.4 SUBMITTALS

In accordance with Section 230200 provide the following:

# WATER TREATMENT (HVAC)

- A. Manufacturer's Literature and Data:
  - 1. Cleaning compounds and procedures.
  - 2. Chemical treatment for closed systems.
  - 3. Chemical treatment for steam systems, including installation and operating instructions.
  - 4. Chemical treatment for open loop systems.
  - 5. Glycol water heat transfer systems.
- B. Water analysis verification.
- C. Materials Safety Data Sheet for all proposed chemical compounds.
- D. Maintenance and operating instructions.

# PART 2 – PRODUCTS

- 2.1 CLEANING COMPOUNDS:
  - A. Alkaline phosphate or non-phosphate detergent/surfactant/specifically to remove organic soil, hydrocarbons, flux, pipe mill varnish, pipe compounds, iron oxide, and like deleterious substances, with or without inhibitor, suitable for system wetted metals without deleterious effects.
  - B. Refer to Section, PIPING SYSTEMS & ACCESSORIES HVAC, PART 3, for flushing and cleaning procedures.
- 2.2 CHEMICAL CLEANING OF NEW SYSTEMS
  - A. Fill closed recirculating systems and add sufficient detergent and dispersant to remove all dirt, oil and grease. Circulate system for at least 24 hours, after which open a drain valve at lowest point, open the make-up water valve and allow to bleed while system continues to circulate. Check the automatic make-up valve to be sure it is operating. Bleeding shall continue until water runs clear and all detergent is removed. Test sample of water and if pH exceeds the pH of the makeup water, flushing shall be resumed.
  - B. Drain all detergent solution from system piping and equipment to nearest floor drain or indirect waste point connected to the building's sanitary system.

### PART 3 – EXECUTION

- 3.1 INSTALLATION:
  - A. Delivery and Storage: Deliver all chemicals in manufacturer's sealed shipping containers. Store in designated space and protect from deleterious exposure and hazardous spills.
  - B. Install equipment furnished by the chemical treatment supplier and charge systems according to the manufacturer's instructions and as directed by the Technical Representative.
  - C. Perform tests and report results.

# WATER TREATMENT (HVAC)

D. Instruct owner personnel in system maintenance and operation.

### 3.2 INSPECTIONS AND MAINTENANCE:

- A. Furnish complete inspection and maintenance service on water treatment equipment for a period of one year after completion and acceptance of the water treatment equipment installation. This maintenance service shall begin concurrently with the guarantee. Maintenance work shall be performed by skilled personnel directly employed and supervised by the same company that provided the water treatment equipment specified herein.
- B. The maintenance service shall include the following:
  - 1. Monthly systematic examination of equipment.
  - 2. Cleaning, lubricating, adjusting, repairing and replacing of all parts as necessary to keep the equipment in first-class condition and proper working order.
  - 3. Furnishing all lubricant, cleaning materials and parts required.
  - 4. The operational system shall be maintained to the manufacturer's standards specified including any changes and/or adjustments required to meet varying conditions.
  - 5. Provide 24 hour emergency call-back service which shall consist of promptly responding to calls within two hours for emergency service should a shutdown or emergency trouble develop between regular examinations. Overtime emergency call-back shall be limited to minor adjustments and repairs required to protect the immediate safety of the equipment.
  - 6. Service personnel shall report to the owner or his authorized representative upon arrival and again upon completion of the required work. A copy of the work ticket containing a complete description of the work performed shall be given to the owner.
  - 7. The Contractor shall maintain a log in the boiler room and chiller room. The log shall list the date and time of all monthly examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary correction performed and/or parts replaced.

# END OF SECTION 230510

# SECTION 230600: AIR DISTRIBUTION & ACCESSORIES - HVAC

PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
  - B. Refer to Section 230200 for HVAC General Provisions
  - C. Refer to Section 230210 for HVAC Basic Materials & Methods.
  - D. This Contractor shall coordinate with the work of Division 16 and the Fire Alarm System vendor for locations and mounting of all duct smoke detectors. These devices are shown on the Mechanical Drawings for reference only to show the intent of the work. All locations shall be determined based on approved shop drawings from the Fire Alarm System vendor and the Contractor for the work of Division 26, Electrical. Mount smoke detectors in the supply and return air stream at each unit in accordance with NFPA 72.

### 1.2 DESCRIPTION OF WORK

- A. This Section includes labor, material, equipment and supervision to provide a complete air distribution system as specified herein and as shown on drawings.
  - 1. Ductwork Single Wall, Square and Rectangular
  - 2. Ductwork Single Wall, Spiral Round
  - 3. Flexible Air Duct
  - 4. Fume Hood Exhaust Ductwork Laboratory Fume Hood
  - 5. Flexible Connections
  - 6. Dampers
  - 7. Fire Dampers
  - 8. Air Diffusers, Registers and Grilles
  - 9. Prefabricated Roof Curbs and Equipment Supports
  - 10. VAV Units with Reheat
  - 11. Sound Attenuation

### 1.3 REFERENCE STANDARDS

- A. Refer to Section 230200 for a general description of requirements applying to this section.
- B. Requirements established within the portions of the Project Manual titled Division 1, General Requirements, are collectively applicable to the work of this section.
- C. IMC (International Mechanical Code).
- D. SMACNA (Sheet Metal and Air Conditioning Contractors National Association, Inc.)

- E. American Society of Heating, Refrigerating and Air Conditioning Engineers' recommendations in ASHRAE Guide shall apply to this work.
- F. ARI Standard 885 Standard for Estimating Occupied Sound Levels in the Applications of Air Terminals and Air Outlets.
- G. UL (Underwriter's Laboratories, Inc.)
- H. NFPA 90A shall apply to this work.
- I. State Fire Prevention Regulations.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 230210 for a general description of requirements applying to this Section.
- 1.5 SUBMITTALS
  - A. Submit shop drawings and product data in accordance with Section 230200.
  - B. Submit the following:
    - 1. Shop drawings of all sheet metal. Indicate all steel, piping, conduit, and Architectural/Structural features to demonstrate complete coordination. Scale shall not be less than 1/4".
      - a. Shop drawings shall indicate the sizes and lengths of each section of ductwork as well as all system components such as coils, VAV boxes, access doors, dampers, diffusers and register locations. Also indicate the type of joints used and where internal acoustic lining or insulation, if required, will be utilized.
      - b. The location of the duct runs and the air outlets shall be closely coordinated with all other trades by the sheet metal contractor to avoid interference. The shop drawings shall show the contact surfaces adjacent to the ducts or air outlets and the space assigned for concealment. The drawings shall indicate principal items of equipment, adjacent piping and conduit, etc., the location of which shall be secured from the contractors of other trades.
      - c. Sheet Metal Contractor to include resubmissions of the shop drawings to the Engineer. The resubmissions are to include all corrections to previous submissions.
    - 2. Manufacturer's literature and performance data of all equipment and devices.
    - 3. Samples: Furnish color samples, etc., at request of the Architect.

# 1.6 SUBSTITUTIONS

A. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents. This shall include, but shall not be limited to space requirements, code clearances, the type, horsepower,

### AIR DISTRIBUTION & ACCESSORIES – HVAC

capacities, number and size of services required from other trades, including all required ancillary items furnished and installed by other trades. If the manufacturer or related bidding contractor does not comply with these requirements, they shall be responsible for any and all additional costs associated with the changes required by other trades.

- 1.7 WARRANTY GUARANTEE
  - A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, General Requirements.

# PART 2 – PRODUCTS

# 2.1 DUCTWORK (SINGLE WALL, SQUARE AND RECTANGULAR)

A. All ductwork shall be fabricated in accordance with SMACNA "HVAC Duct Construction Standards - Metal and Flexible" latest Edition except as described below. The minimum thickness of metal ductwork is 26 gauge. Fabrication requirements shall be based on ductwork subjected to positive or negative pressures of 3" W.G. Ductwork systems shall be sealed to SMACNA "Seal Class "A" Standards. Alternatively, "Ductmate" System 45 can be used in accordance with manufacturer's specifications. Drive slip joints are not permitted.

Exception: For ductwork <u>smaller</u> than 12" x 8", Contractor may provide slip and drive joints with all joints sealed with Hardcast tape and mastic system.

- B. Rectangular ducts for 3" W.G. or less, positive or negative pressure shall be per SMACNA Table 1-7. Longitudinal seams shall be Pittsburgh Lock Type L-1 per SMACNA Figure 1-5. Transverse joints shall be standing seam type T -15 per Figure 1-4.
  - 1. In the event that material size is not compatible with duct size and segmenting must be utilized to fabricate duct, use SMACNA Figure 1-5, seam L-4 (Standing Seam).
- C. Joints:
  - 1. Per SMACNA Transverse Joint Reinforcement Table 1-12, only joints T -22, T -25a, T -25b and Proprietary slip on flanges will be acceptable.
  - 2. Joints T -25a and T -25b that have stress fractures from bending will not be accepted.
  - 3. All joints will have butyl gasket 3/16" thick by 5/8" wide installed per manufacturers installation instructions.
- D. Ductwork systems for this standard shall be galvanized sheet steel, commercial quality of lock forming grade, conforming to ASTM coating standards A-525 or A-527 with coating of designation G-60. For corrosive or moist conditions, use coating designation G-90.
- E. The size and configuration of each duct shall be indicated on design drawings. Where thicker sheets or different types of materials are required, they shall be specified on the design drawings or in the project specifications.

# 2.2 DUCTWORK (SINGLE WALL, SPIRAL ROUND)

- A. Design Pressure: 3"
- B. Leakage: All ductwork shall meet SMACNA Class "A" leak standards.
- C. Fabrication:
  - 1. Gauges, reinforcing angles, seams, joints, fabrication methods, installation methods and practices, duct reinforcement, fabricated dampers and devices installed in duct system, fittings, etc., shall conform to the latest editions of SMACNA standards for construction in accordance with requirements indicated in these specifications.
  - 2. Minimum metal gauges shall be 26 gauge (.019). Follow SMACNA Table 3-2A for Positive pressure and Table 3-2B for Negative pressure.
- D. Joints:
  - 1. Duct up to 36" diameter Male/Female beaded slip joint similar to SMACNA Figure 3-2, joint RT-1 or RT-5, as long as it meets the criteria for the system design pressure. Fittings shall be undersized to fit into spiral duct. All joints shall be secured with a minimum of 4 screws on each duct section (equally spaced). Seal joint with an approved sealant compound, continuously applied prior to assembly of joint and after fastening, making certain that the majority of the sealant resides on the interior of the joint.
  - 2. Duct 37" 60" diameter: Companion angle Vanstone with full face gaskets having bolt holes punched through prior to insertion of bolts. Gasketing shall be 1/8" thick. Joint is per SMACNA Figure 3-2, joint RT -2 and RT -2A.
  - 3. For all dust collection and particulate carrying duct, SMACNA Figure 3-2, joint RT -3 up to 16" diameter and RT -2 or RT -2A are the only acceptable joints. RT -3 joints do not require any additional sealant as long as the band has gasketing installed by manufacturer. Joints RT -2 and RT -2A require full face gaskets having bolt holes punched through prior to insertion of bolts. Gasketing shall be 1/8" thick. There shall be no fasteners penetrating the duct for collection systems.
  - 4. In lieu of beaded slip connections or Vanstone angle ring connections (the above-mentioned joints), there are proprietary connections that may be used, as long as they meet the pressure criteria set forth in this specification.

## 2.3 FLEXIBLE AIR DUCT

- A. Insulated flexible air duct shall be non-metallic. Air duct shall comply with the latest NFPA Bulletin No. 90A and be labeled as Class 1 Air Duct, U.L. Standard No. 181.
- B. Air ducts shall be suitable for working pressure of not less than plus 10.0 and minus 0.5 inches of W.G.

- C. Non-metallic air duct shall be two element spiral construction composed of a corrosion resisting metal supporting spiral and a vinyl coated fiberglass base fabric and shall be mechanically interlocked together.
- D. Insulation shall be fiberglass flexible blanket with vapor barrier outer jacket of polyethylene or reinforced mylar. Maximum thermal conductance of 0.23 Btu/Hr./SF/Inch at 75 deg. F temperature.
- E. Approved manufacturers shall include the Wiremold Company, Flexmaster USA, Owens-Corning, Thermaflex Flex Vent.
- 2.4 FUME HOOD EXHAUST DUCTWORK LABORATORY FUME HOOD AND CANOPY
  - A. Polyvinyl Chloride (PVC) Pipe: ASTM D-1785 Schedule 40, Type 1, Grade 1.

# OR

- A. Type 304 stainless steel with 2B finish for exposed work in finished areas; 2D finish for concealed work and work above roof.
- B. Metal gauge per SMACNA Standard, liquid-tight welded construction, continuous exterior weld for all seams and joints.
- C. General material requirements per ASTM A480 and A276 for 300 series alloys.
- 2.5 FLEXIBLE CONNECTIONS
  - A. Required between ductwork and suction and discharge connection of all fans and air handlers.
  - B. Material: Woven fiberglass with mounting hardware tested in accordance with UL Standard 181, listed and labeled as Class 0 or 1.
  - C. Manufacturer: Ventfabrics, Inc., Durodyne, Dynair, Ductmate Pro Flex.
- 2.6 DAMPERS
  - A. Provide where indicated and required to control flow of air and balance system.
  - B. Round dampers shall be single blade, molded synthetic bearings at each end, 20 gauge galvanized steel, adjusting quadrant and locking device. Round dampers shall be Ruskin Model MDRS25.
  - C. Rectangular and square dampers shall be opposed blade within 16 gauge galvanized steel channel frame with corner brace, 16 gauge galvanized steel blades; molded synthetic bearings and hex steel shafts, exposed or concealed linkage, adjustable quadrant and locking device. Dampers shall be Ruskin Model MD35.
  - D. Approved Manufacturers: Ruskin, Arrow, Nailor-Hart, Pottorff, Lloyd Industries, Inc., Cesco Products, Louvers & Dampers.

## 2.7 FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555.
  - 1. Ceiling Dampers: Galvanized steel, 22 gauge frame and 16 gauge flap, two layers 0.125 inch ceramic fiber on top side with locking clip.
  - 2. Horizontal Dampers: Galvanized steel, 22 gauge frame, stainless steel closure spring, and lightweight, heat retardant, non-asbestos fabric blanket.
  - 3. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for closure under air flow conditions. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.
  - 4. Multiple Blade Dampers: 16 gauge galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x <sup>1</sup>/<sub>2</sub> inch plated steel concealed linkage, stainless steel closure spring, blade stops and lock.
  - 5. Fusible Links: UL 33, separate at 160 deg. F with adjustable link straps for combination fire/balancing dampers.
- B. Fire dampers of the applicable rating shall be provided at all locations where ductwork penetrates fire-rated walls, ceilings, or floors. Refer to Architectural Drawings.
- C. Manufacturers: Air Balance, Inc., Ruskin, Louvers & Dampers, Prefco, Phillips-Aire, Metalaire, Pottorff, Lloyd Industries, Inc., Cesco Products, Greenheck.

# 2.8 AIR DIFFUSERS, REGISTERS AND GRILLES

- A. Air diffusing terminals shall be provided in duct runs on drawings. The diffusers shall properly and uniformly distribute the design air quantity with no objectionable drafts, while maintaining not more than 50 F. P. M. velocity in the occupied portion of the space.
- B. Ceiling Diffusers:
  - 1. Square Louvered Diffuser Face:
    - a. Square housing, welded steel construction core of square concentric louvers, removable at face of diffuser, round duct connection, with borders suitable for lay-in ceiling tile application.
    - b. Diffuser Patterns: Fixed louver face for 1, 2, 3, or 4 direction air flow, direction indicated on drawings. Each diffuser shall be provided with adjustable control grids.
    - c. Finish: Matte white finish.
    - d. Manufacturers: Titus Model TDC.

- C. Registers & Grilles:
  - 1. Ceiling Return Register (CR):
    - a. Ceiling registers shall have a perforated face with 3/16-inch diameter holes on 1/4-inch staggered centers and no less than 51 percent free area. Perforated face shall be aluminum according to the model selected. The back pan shall be one piece stamped heavy gauge steel of the sizes and mounting types shown on the plans and outlet schedule.
    - b. The finish shall be #26 white. The finish shall be a baked on anodic acrylic paint, with a pencil hardness of HB to H. Inside of back pan shall be painted flat black.
    - c. Titus Model: PAR
  - 2. Supply, Return, Exhaust and Transfer Grilles (SG, RG, EG & TG):
    - a. Grilles shall be available parallel to the long dimension of the grille. Construction shall be of steel with a 11/4-inch wide border on all sides. Screw holes shall be countersunk for a neat appearance. Corners shall be welded with full penetration resistance welds.
    - b. Deflection blades shall be firmly held in place by mullions from behind the grille and fixed to the grille by welding in place. Blade deflection angle shall be available at 35°.
    - c. The finish shall be #26 white. The finish shall be a baked on anodic acrylic paint, with a pencil hardness of HB to H.
    - d. Titus model: 300 RL (SG), 355RL (RG, EG, & TG)
- D. Manufacturers: Provide diffusers, registers and grilles of one of the following:

| Anemostat  | Price             |
|------------|-------------------|
| Carnes Co. | Titus             |
| Krueger    | Tuttle & Bailey   |
| Metalaire  | Nailor Industries |

# 2.9 PREFABRICATED ROOF CURBS AND EQUIPMENT SUPPORTS

- A. Factory fabricated by the manufacturer of the respective roof-mounted equipment when available and capable of meeting the following requirements:
  - 1. Thermally and acoustically insulated, rubber isolating pads.
  - 2. Built to suit slope of roof and type of roofing; i.e. standing metal seam with integral cant strip and flashing extension.
  - 3. 8" to 11" height unless otherwise indicated.
  - 4. Support rails shall be aluminum, or sheet steel, with continuous wood nailer and removable counterflashing.

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- B. Curbs shall be a product of a custom manufacture in the following cases:
  - 1. Curbs as specified are not available from the respective equipment manufacturer.
  - 2. Piping or ducts penetrating roof.
  - 3. Prefabricated equipment supports are required.
  - 4. Step flashing assembly, EPDM for normal use and silicone for pipe temperatures above 200°F stainless steel clamp, suitable for single or multiple pipes.
- C. Pipe supports shall be a product of a custom manufacture equal to Pipe Prop as made by JMB Industries, or Anvil International Haydon H-Block.
- D. Manufacturers: Pate, Shipman, Custom Curb, Portals Plus, Lloyd Industries, Inc.

# 2.10 VAV UNITS WITH REHEAT

- A. Terminal units designated shall be pressure independent type and of sizes shown on drawings or terminal unit schedule. Units shall have factory catalog performance ratings which conform to CFM, Heating Capacity, Static Pressure discharge and radiated sound power and attenuation designated.
- B. Cabinets shall be constructed of not lighter than 22 gauge, zinc-coated steel with factory applied enamel paint finish. Internal surfaces shall be acoustically and thermally insulated with 1 inch glass fiber material surface-treated to prevent erosion and having U.L.181 approval meeting NFPA 90A.
- C. Heating coil shall be copper tube, aluminum fin. Coil performance data shall be based on test in accordance with AHRI Standard 410.
- D. Air volume damper shall be constructed to prevent air leakage in excess of 2% of rated air quantity at 1" inlet static pressure.
- E. Automatic damper operators shall be factory installed and thoroughly tested for proper performance.
- F. Performance of units shall be based on tests conducted in accordance with AHRI Standard 880 Certification Program.
- G. Units shall be as manufactured by Trane, Carnes, Carrier, Titus, Nailor-Hart Industries, Metalaire, Tuttle & Bailey.
- 2.11 SOUND ATTENUATION
  - A. Provide silencers of the types and sizes shown on plans.
  - B. Materials and Construction:

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- 1. Outer casings of rectangular silencers shall be made of 22 gauge galvanized steel in accordance with ASHRAE Guide recommended construction for high pressure rectangular duct work. Seams shall be lock formed and mastic filled.
- 2. Outer casings of tubular silencers shall be made of galvanized steel.
- 3. Interior partitions for rectangular silencers shall be made of not less than 26 gauge galvanized perforated steel.
- 4. Interior construction of tubular silencers shall be compatible with the outside casings.
- 5. Filler material shall be of inorganic mineral or glass fiber of a density sufficient to obtain the specified acoustic performance and be packed under not less than 5 % compression to eliminate voids due to vibration and settling. Material shall be inert, vermin and moisture-proof.
- 6. Combustion rating for the silencer acoustic fill shall be not less than the following when tested in accordance with ASTM-E-84, NFPA Standard 255 or UL No. 723:

| Flamespread Classification | 25 |
|----------------------------|----|
| Smoke Development Rating   | 15 |
| Fuel Contribution          | 20 |

- 7. Airtight construction shall be provided by use of a duct sealing compound on the job site. Material and labor furnished by contractor. Silencers shall not fail structurally when subjected to a differential air pressure of 8 in. w .g. inside to outside of casing.
- C. Acoustic Performance: Silencer ratings shall be determined in a duct- to-reverberant room test facility which provides for airflow in both directions through the test silencer in accordance with ASTM Specification E-477. The test set-up and procedure shall be such that all effects due to end reflection, directivity, flanking transmission, standing waves and test chamber sound absorption are eliminated. Acoustic ratings shall include Dynamic Insertion Loss (DIL) and Self- Noise (SN) Power Levels both for Forward Flow (air and noise in same direction) and Reverse Flow (air and noise in opposite directions) with airflow of at least 2000 fpm entering face velocity.
- D. Aerodynamic Performance: Silencer shall be of the low static pressure loss type. Airflow measurements shall be made in accordance with ASTM specification E-477 and applicable portions of ASME, AMCA and ADC airflow test codes. Tests shall be reported on the identical units for which acoustic data is presented.
- E. Certification: With submittals, the manufacturer shall supply certified test data on Dynamic Insertion Loss, Self-Noise Power Levels, and Aerodynamic Performance for Reverse and Forward Flow test conditions. Test data shall be for a standard product. All rating tests shall be conducted in the same facility, shall utilize the same silencer, and shall be open to inspection upon request from the Architect/Engineer.
- F. Manufacturers: Industrial Acoustics Co., Rink, Commercial Acoustics, Dynasonics, BRD, Vibro-Acoustics.

## PART 3 – EXECUTION

#### 3.1 DUCTWORK

- A. Dimensions on drawings are inside dimensions. Sheet metal dimensions shall be increased to suit thickness of acoustic duct lining, if applicable.
- B. Ducts shall be concealed unless otherwise indicated.
- C. Changes in direction shall be made with radius bends or turning vanes.
- D. Supports shall be galvanized steel for steel ductwork and aluminum for aluminum ductwork.
- E. Locate ceiling air diffusers, registers, and grilles on "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling modules.
- F. Do not install ductwork directly above any electrical equipment.
- G. Ductwork shall be supported per SMACNA Standards except as follows:
  - 1. Rivet or screw to side of duct when using flat strap hangers. Rivet or screw to bottom of duct when using trapeze hangers.
  - 2. Extend hangers down the side of the duct at least 9"; pass hangers under ducts less than 9" deep.
  - 3. Space hangers not more than 8' on centers for ducts up to 18" wide and 4' on centers for ducts over 18" wide.
  - 4. Wire hangers are not acceptable.
  - 5. Support ductwork from building structure with expansion bolts, rods, steel angles or channels installed to meet existing or new building conditions.
  - 6. Drilling into the roof deck is not permitted.
  - 7. Driving nails into anchors is not permitted.
- H. Air Flow Control:
  - 1. Major take-offs: Install volume control dampers.
  - 2. Branches: Install volume control dampers in all branches and at tap in branch take-off connections.
  - 3. Elbows: Use unvaned elbows with throat radius equal to width of duct and full heel radius; provide turning vanes where full throat and heel radius are not possible.

- 4. Transitions: Make transitions in ducts as required by structural or architectural interferences.
  - a. Proportion airways to compensate for any obstructions within duct.
  - b. Avoid dead ends and abrupt angles.
  - c. Do not exceed 15 degrees slope on sides of transitions.
- I. For all exterior single wall, square or rectangular ductwork, ensure that the top of all horizontal ductwork is crowned to minimize accumulation of weather on top of the finished insulation system jacket specified in Section 230230.
- J. Ductwork on the roof shall be supported by an engineered, prefabricated hanger system specifically designed for installation on the roof without roof penetrations, flashing or damage to the roofing material. The system shall consist of bases made of high density polypropylene plastic with additives for UV protection, hot dipped galvanized structural steel frames, hangers, fasteners, rods, etc. The system shall be completed and designed to fit the ductwork installed under actual conditions of service. The system shall be furnished as manufactured by PHP Systems & Design or Anvil International Haydon H-Block. (Designer Choice)

# 3.2 FLEXIBLE AIR DUCT

- A. When flexible duct is used for final connection between duct mains on branches and diffusers on registers. The maximum length of flexible ductwork shall be 5'-0" in length.
- B. Flexible ductwork shall be properly hung at the tap collar in order to prevent eventual wear and damage to the flexible duct.
- C. The ceiling tile system should not be considered a support on which to lay flexible duct. Refer to SMACNA Standards for proper installation.
- 3.3 DUCT SYSTEM LEAK SEALING
  - A. Joints in duct systems at duct heaters, air monitors, fire dampers, sound traps, supply air terminals including air handling light fixtures, shall be sealed to prevent air leakage.
  - B. All duct joints and seams in medium pressure and high pressure duct systems shall be sealed to SMACNA Seal Class" A" Standards to prevent air leakage.
  - C. In the event there is in excess of 5% air leakage indicated in low pressure duct systems, it shall be the Contractors responsibility to seal the duct system. The amount of sealing necessary shall be that required to obtain the design air quantity at each terminal.
  - D. Duct sealing shall be by means of high velocity duct sealants such as Hardcast and/or Neoprene gaskets. Type of sealant and method of application shall conform to recommendations in SMACNA high velocity duct construction standards.

# 3.4 DUCTWORK TESTING

A. The following ductwork shall be pressure leak tested:

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- 1. Supply ductwork
- 2. Return ductwork
- 3. Exhaust ductwork
- B. All tests shall be conducted in accordance with AABC National Standards.
- C. Ducts to be tested at 100% maximum of static pressure before any duct is insulated externally and concealed in accordance with SMACNA Standards.
- D. Calculate the allowable leakage using leakage factor of 5% of Design Air Flow.
- E. Select a limited section of duct for which the estimated leakage will not exceed capacity of the test apparatus.
- F. Connect the blower and flow meter to the duct section and provide temporary seals at all openings of the ductwork.
- G. Start the blower motor with the inlet damper closed. Increase pressure until the required level is reached.
- H. Read the flow meter and compare the leakage in cfm. Reading should be 5% or less of design flow for the duct segment being tested.
- I. If reading is more than 5% of design flow, depressurize duct, repair all leaks and retest until 5% or less of design flow is obtained.
- J. Complete test reports and obtain Owner's witness signature.
- K. Remove all temporary blanks and seals.
- L. Warning: Do not overpressure duct.

# 3.5 EQUIPMENT

- A. Test apparatus shall consist of an airflow measuring device, flow producing unit, pressure indicating devices and accessories necessary to connect the metering system to the test specimen.
- B. The Contractor conducting tests shall arrange for or provide all temporary services, all test apparatus, all temporary seals and all qualified personnel necessary to conduct the specified testing.
- C. Test apparatus shall be accurate within plus or minus 7.5% at the indicated flow rate and test pressure and shall have calibration data or a certificate signifying manufacture of the meter in conformance with the ASME Requirements for Fluid Meters. Verification of above, to be supplied to Owner upon request.
- D. Pressure differential sensing instruments shall be readable to 0.05" scale division for flow rates below 10 cfm or below 0.5" w.g. differential. For flows greater than 10 cfm scale divisions of 0.1" are appropriate. U-tube manometers should not be used for reading less than 1" of water.

- E. Liquid for manometers shall have a specific gravity of 1 (as water) unless the scale is calibrated to read in inches of water contingent on use of a liquid of another specific gravity, in which case the associated gauge fluid must be used.
- F. Instruments must be adjusted to zero reading before pressure is applied.
- 3.6 TEST REPORT
  - A. Log the project and system identification data.
  - B. Enter the fan CFM, the test pressure, and the leakage class specified by the designer.
  - C. Enter an ide ntification for each duct segment to be tested.
  - D. Calculate the allowable leakage factor. Enter this number on the report for each test segment.
  - E. Conduct and record the field tests. If the sum of the CFM measured is less than or equal to the sum of the allowable leakage, the test is passed. Record the date(s), presence of witnesses and flow meter characteristics.
  - F. Maintain a mechanical duct plan of all tested duct segments. Plan to include duct segment identification and dates tested.
  - G. Test reports shall be submitted as required by the project documents.

### 3.7 LABELING

A. At all fire damper, smoke damper and combination fire/smoke damper locations, access doors in ductwork shall be identified with a permanent placard of red-white-red laminated commercial grade plastic construction, minimum one-half inch high capital letters, reading, "FIRE DAMPER", "SMOKE DAMPER", "FIRE/SMOKE DAMPER" as appropriate for the installation. Attach securely to face of access door with brass screws at each corner, sealed airtight.

# END OF SECTION 230600

#### SECTION 230605: FANS

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
  - B. Refer to Section 230200 for HVAC General Provisions
  - C. Refer to Section 230210 for HVAC Basic Materials & Methods.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes labor, material, equipment and supervision to provide a complete air distribution system as specified herein and as shown on drawings.
    - 1. Fans (Utility Set Type)
    - 2. High Plume Dilution Exhaust fan (Fume Hood)
- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 230200 for a general description of requirements applying to this section.
  - B. Requirements established within the portions of the Project Manual titled Division 1, General Requirements, are collectively applicable to the work of this section.
  - C. IMC (International Mechanical Code)
  - D. SMACNA (Sheet Metal and Air Conditioning Contractors National Association, Inc.)
  - E. American Society of Heating, Refrigerating and Air Conditioning Engineers' recommendations in ASHRAE Guide shall apply to this work.
  - F. UL (Underwriter's Laboratories, Inc.)
  - G. NFPA 90A shall apply to this work.
  - H. State Fire Prevention Regulations.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 230210 for a general description of requirements applying to this Section.

B. Whenever a variable frequency PWM drive is installed to control an AC motor, a maintenance-free, circumferential, conductive micro fiber shaft grounding ring shall be installed on the AC motor drive end to discharge shaft currents to ground. Recommended part: AEGIS SGR<sup>TM</sup> Bearing Protection Ring, as made by Electro Static Technology. Install in accordance with the manufacturer's written instructions.

# 1.5 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 230200.
- B. Submit the following:
  - 1. Shop drawings of all sheet metal. Indicate all steel, piping, conduit, and Architectural/Structural features to demonstrate complete coordination. Scale shall not be less than 1/4" = 1'-0".
  - 2. Manufacturer's literature and performance data of all equipment and devices.

# 1.6 SUBSTITUTIONS

A. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents and as described within the specifications. This shall include, but shall not be limited to space requirements, code clearances, the type, horsepower, capacities, number and size of services required from other trades, including all required ancillary items furnished and installed by other trades. If the manufacturer or related bidding contractor does not comply with these requirements, they shall be responsible for any and all additional costs associated with the changes required by other trades.

# 1.7 WARRANTY/GUARANTEE

A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, General Requirements.

# PART 2 – PRODUCTS

- 2.1 FANS (UTILITY SET TYPE)
  - A. Utility set type fans shall be completely assembled units consisting of a continuously welded steel scroll housing, centrifugal fan wheel, structural steel base and motor combination with inlet and outlet flanges prepunched.
  - B. Fan wheel shall be multi-blade type with hub and backplate and inlet ring. Entire fan wheel assembly shall be steel or aluminum. Fan blades shall be forward or backward inclined type. Where explosion-proof fans are called for, provide spark-proof fan. Wheel shall be statically and dynamically factory balanced.
  - C. Scroll housing shall be steel with adjustable discharge feature. Inlet cone shall be spun steel with streamline venturi characteristic. Access door shall provide inspection of wheel and fan interior, fully hinged with multiple closures.

- D. Fan motor shall have copper windings and be grease packed ball bearing type of TEFC or open drip-proof construction. Where called for on drawings or indicated in schedule, provide explosion-proof motors.
- E. Fan wheel shall be indirectly driven through a V-belt drive, and the drive shall be designed for 150% of the driven load and the motor pulley shall be adjustable pitch type. Where called for on drawings or indicated in schedule, provide explosion-proof motors. Fan shaft shall be ASTM A-108 steel, grade 1018 or 1045.
- F. Fans on roof shall be provided with a hinged weather hood over motor and drive, and a drain connection in bottom of scroll housing. The weather hood shall also protect a disconnect switch which shall be factory mounted by the fan manufacturer. Hood shall be vented to reduce heat build-up.
- G. Fans shall bear the AMCA seal and shall be manufactured by Acme, Aerovent, American Coolair/ILG, Buffalo Forge, Hartzell, Loren-Cook, Temtrol, Twin City Fan.
- 2.2 HIGH PLUME DILUTION EXHAUST FANS (CHEMICAL FUME HOODS)
  - A. Fans shall have been tested in accordance with AMCA Standards 210 and 300 and shall bear the AMCA seal for Certified Sound and Air Performance.
  - B. Classification for spark resistant construction shall conform to AMCA "C" per Standard 99.
  - C. Fans shall include a certificate of compliance with these standards prior to shipment.
  - D. Fans shall provide mixed flow, high plume, vertical discharge and be suitable for roof mounting without the need for guy wire supports.
  - E. All steel and aluminum parts of the fans shall be cleaned and coated with a minimum of 4 mils of epoxy or polyester resin per fan manufacturer's standards.
  - F. Each fan shall be belt driven, AMCA arrangement 10, with drive belts and sheaves sized for 200% of fan operating brake horsepower, readily accessible for service and adjustment; shaft shall be ANSI C-1045 steel with protective coating, or 316 stainless steel.
    - 1. Fan impeller shall be centrifugal, backward inclined air foil design, factory balanced, coated steel construction.
  - G. Fan shall include a steel or FRP windband and discharge nozzle to induce outside air up to 270% of fan design flow rate, or provide a high velocity conical discharge nozzle to efficiently handle outlet velocities up to 6000 fpm.
  - H. All fasteners shall be 316 stainless steel.
  - I. Fan assembly shall be mounted on an inlet mixing plenum of heavy gauge steel, all welded, with hinged access door and safety screen, aluminum opposed blade bypass damper, with rain hood for introducing outside air at roof level upstream of the fan.

- 1. Plenum shall be mounted on roof curb or rails with flexible PVC connection between plenum and fan inlet.
- 2. Damper actuator shall be provided as part of the work of Section 230900 Controls.
- J. Isolation shall be limited to rubber in shear pad type devices provided by the fan manufacturer.
- K. Fan motors shall be high efficiency, TEFC, with a 1.15 service factor.
- L. Fan bearings shall be minimum L-10 life of 200,000 hours with ball or spherical pillow block type sealed to retain lubrication and exclude dust and air, with lines extended to grease fittings outside fan housing.
- M. Fan accessories shall include bolted access cover for impeller service, internal drain system to divert rain water away from the building duct connection, NEMA 3R non-fused disconnect switch factory mounted and wired to the motor. Color as selected by Architect from manufacturer's standard color chart.
- N. Manufacturers: Axijet-F as made by M.K. Plastics Corporation, Tri-Stack Fan as made by Strobic Air Corporation, Model TCB-LE as made by Greenheck Fan Corp., Model TFE as made by Twin City Fan and Blower or Model TCNHBLE as made by Loren Cook..

# PART 3 – EXECUTION

- 3.1 FANS, EQUIPMENT AND ACCESSORIES
  - A. Install in accordance with manufacturer's details and instructions.
  - B. Mount fan speed control at the fan to facilitate mechanical balancing. Power wiring shall be part of the work of Division 26.
  - C. Perform field mechanical balancing in accordance with Section 230950: TESTING AND BALANCING OF MECHANICAL SYSTEMS.
  - D. Install units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
  - E. Support: Install and secure roof curb structure, in accordance with National Roofing Contractor's Association (NRCA) installation recommendations and shop drawings. Install and secure units on curbs and coordinate roof penetrations and flashing.
  - F. The Mechanical Contractor shall own as a part of his work, the following:

Provide one (1) additional drive set, if necessary, to obtain final design balancing requirements. The Mechanical Contractor shall coordinate with Balancing Firm and equipment manufacturer for drive selection, including belts and pulleys.

# END OF SECTION 230605

# SECTION 230760: AIR HANDLING EQUIPMENT

### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
  - B. Refer to Section 230200 for HVAC General Provisions
  - C. Refer to Section 230210 for HVAC Basic Materials & Methods.
- 1.2 DESCRIPTION OF WORK
  - A. This Section includes work necessary and/or required and materials and equipment for construction of a complete system. Such work includes, but is not limited to the following:
    - 1. Packaged Rooftop HVAC Unit with Energy Recovery (Aaon)

# 1.3 REFERENCE STANDARDS

- A. Refer to Section 230200 for a general description of requirements applying to this section.
- B. AMCA Standards 210 and 300 for fans.
- C. ARI Standard 410, ASHRAE Standard 33 for Heating and Cooling Coils.
- D. ASHRAE Standard 52.2 and U.L. Standard 900 for media type air filters.
- E. AMCA Standard 511 and 500D for Air Control Dampers.
- F. AMCA Standard 611 and 610 for air flow measurement stations.
- G. ARI Standard 1060 and ASHRAE Standard 84 for Air-to-Air Energy Recovery Equipment.
- H. ARI Standard 260 and 430 for Air Handling Units.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 230210 for a general description of requirements applying to this Section.
  - B. Whenever a variable frequency PWM drive is installed to control an AC motor, a maintenance-free, circumferential, conductive micro fiber shaft grounding ring shall be installed on the AC motor drive end to discharge shaft currents to ground. Recommended part: AEGIS SGR<sup>TM</sup> Bearing Protection Ring, as made by Electro Static Technology. Install in accordance with the manufacturer's written instructions.

#### 1.5 SUBMITTALS

- A. Submit shop drawings in accordance with Section 230200.
- B. Submit shop drawings and descriptive date for all equipment specified in this section.
- 1.6 SUBSTITUTIONS
  - A. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents. This shall include, but not limited to, space requirements, code clearances, the type, horsepower, capacities, number and size of services required from other trades, including all required ancillary items provided by other trades. If the manufacturer or related bidding contractor does not comply with these requirements, this Contractor shall be responsible for any and all additional costs associated with the changes required by other trades.

## 1.7 WARRANTY/GUARANTEE

- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, General Requirements. In addition, the following special guarantee applies:
  - 1. Each compressor unit shall be provided with manufacturer's five (5) year parts and labor warranty.

# PART 2 – PRODUCTS

### 2.1 ROOFTOP UNITS

- A. General Description
  - 1. Outdoor air handling unit shall include filters, supply fans, dampers, chilled water coils, hot water coils, exhaust fans, energy recovery wheels, and unit controls.
  - 2. Unit shall be factory assembled and tested including leak testing of the chilled water coils and hot water coils, and run testing of the completed unit. Run test report shall be supplied with the unit in the service compartment's literature pocket.
  - 3. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.
  - 4. Unit components shall be labeled, including pipe stub outs, electrical and controls components.
  - 5. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.
  - 6. Installation, Operation, and Maintenance manual shall be supplied within the unit.
  - 7. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's hinged access door.

- 8. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.
- B. Construction
  - 1. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.
  - 2. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.
  - 3. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel, and prevents exterior condensation on the panel.
  - 4. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
  - 5. Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.
  - 6. Access to filters, dampers, cooling coils, heating coils, exhaust fans, energy recovery wheels, and electrical and controls components shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.
  - 7. Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
  - 8. Units with cooling coils shall include double sloped 304 stainless steel drain pans.
  - 9. Unit shall be provided with base discharge and return air openings. All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening.
  - 10. Unit shall include lifting lugs on the top of the unit.
- C. Supply Fans
  - 1. Unit shall include direct drive, unhoused, backward curved, plenum supply fans.
  - 2. Blowers and motors shall be dynamically balance and mounted on rubber isolators.

# AIR HANDLING EQUIPMENT

- 3. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
- 4. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.
- D. Exhaust Fans
  - 1. Exhaust dampers shall be sized for 100% relief.
  - 2. Fans and motors shall be dynamically balanced.
  - 3. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
  - 4. Access to exhaust fans shall be through double wall, hinged access doors with quarter turn lockable handles.
  - 5. Unit shall include belt driven, unhoused, backward curved, plenum exhaust fans.
  - 6. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.
- E. Cooling Coils
  - 1. Chilled Water Cooling Coils
    - a. Coils shall be certified in accordance with AHRI Standard 410 and be hydrogen or helium leak tested.
    - b. Coil shall be constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
    - c. Coil shall have half serpentine circuitry, 4 rows and 10 fins per inch.
    - d. Control valves shall be field supplied and field installed.
- F. Preheat
  - 1. Hot Water Preheat Coils
    - a. Coils shall be certified in accordance with AHRI Standard 410 and be hydrogen or helium leak tested.
    - b. Coils shall be constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
    - c. Coil shall have half serpentine circuitry, two rows and 8 fins per inch.

- d. Unit shall include mixed air preheat coils.
- e. Control valves shall be field supplied and field installed.
- G. Filters
  - 1. Unit shall include 4 inch thick, pleated panel filters with an ASHRAE efficiency of 30% and MERV rating of 8, upstream of the cooling coil.
- H. Outside Air/Economizer
  - 1. Unit shall include 0-100% economizer consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 15 cfm of leakage per sq. ft. of damper area when subjected to 2 inches w.g. air pressure differential across the damper. Damper assembly shall be controlled by spring return DDC actuator. Unit shall include outside air opening bird screen, outside air hood, and barometric relief dampers.
- I. Energy Recovery
  - 1. Unit shall contain a factory mounted and tested energy recovery wheel. The energy recovery wheel shall be mounted in a rigid frame containing the wheel drive motor, drive belt, wheel seals and bearings. Frame shall slide out for service and removal from the cabinet.
  - 2. Total Energy Recovery Wheel Unit The rotor media shall be light weight and must be made of aluminum. The rotor media must be coated to prohibit corrosion; etched or oxidized surfaces are not acceptable. All surfaces must be coated with a nonmigrating adsorbent layer of desiccant prior to being formed into the honeycomb media structure to insure that all surfaces are coated and that adequate latent capacity is provided. The desiccant must be designed for the adsorption of water vapor. The media shall be cleanable with low temperature steam, hot water or light detergent without degrading the latent recovery.
  - 3. Sensible and latent recovery efficiencies must be clearly documented through a certification program conducted in accordance with ASHRAE 84-91P and ARI 1060 standards. The certification must have been conducted by a qualified independent organization. The performance certification reports must be provided for engineering review as part of the submittals for this project.
  - 4. The rotor design shall provide laminar flow, providing pressure drop losses no greater than 0.35" at a velocity of 500 fpm, or 0.8 inches at a velocity of 1,000 fpm. The maximum operating temperature of the rotor shall be 180 degrees F. The rotor media must be tested in accordance with NFPA-90A and provide Smoke and Flame ratings of less than 25 and 50. Heat exchanger media tested to UL900 for Class 2 filters is not acceptable.
  - 5. The wheel manufacturer must have been producing energy recovery wheels for a minimum of ten years.

- 6. Rotor Seals The rotor shall be supplied with brush seals, minimizing air leakage and wheel bypass.
- 7. Rotor Support System The rotor media must be provided in a single piece. Replacement of media will include complete cassette to ensure proper balancing on bearings. The media shall be rigidly held by a structural spoke system made of aluminum.
- 8. Unit Housing The rotor housing must be a structural framework which limits the deflection of the rotor due to air pressure loss to less than 1/32 inch. The housing sheet metal shall be made of galvanized steel to prevent corrosion. The rotor shall be supported by two pillow block bearings which can be maintained or replaced without the removal of the rotor from its casing or the media from its spoke system.
- 9. Drive System The rotor must be driven by long-life leather link belt system. The rotor/cassette shall be designed so that belt can be removed or serviced without the removal of the bearing. The rotor bearings shall be greasable and provide L10 life.
- J. Accessories
  - 1. Unit shall be provided with a safety shutdown terminal block for field installation of a smoke detector which shuts off the unit's control circuit.
- K. Power/Electrical Section
  - 1. Unit shall be equipped with a single point electrical connection with motor starters, relays, voltage transformer and terminal block for controls interface, factory mounted disconnect switch.
  - 2. Unit shall include a laminated, color coded electrical wiring diagram attached to the door of the unit. Damper actuators shall be wired to the units low voltage terminal block. All components are UL listed, approved, or classified.
- L. Manufacturers: Basis of design AAON. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work are limited to one of the following:
  - 1. AAON
  - 2. Addison
  - 3. Daikin McQuay
  - 4. Semco
  - 5. Renew-Aire
- M. Any listed equivalent manufacturer and the Mechanical Contractor shall be completely responsible to comply with all requirements as indicated on the contract documents. This shall include, but not be limited to, space requirements, code clearances, the type, horsepower, capacities, number and size of services required from other trades.

#### PART 3 – EXECUTION

#### 3.1 INSPECTION

- A. Examine areas and conditions under which equipment is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.
- B. Install in accordance with manufacturer's recommendations. Unit and all component sections shall be properly supported and vibration isolated.
- 3.2 INSTALLATION
  - A. Verify that coils, filters, motors, drives and other components are matched with the proper unit.
  - B. Assemble unit components following manufacturer's instructions for handling, testing and operation. Repair damaged galvanized areas, and paint in accordance with manufacturer's written recommendations.
  - C. Vacuum clean interior of units prior to operation.
  - D. Repair air leaks from or into casing that can be heard or felt during normal operation.
  - E. Install rooftop units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
  - F. Support: Install and secure roof curb to roof structure, in accordance with National Roofing Contractor's Association (NRCA) installation recommendations and shop drawings. Install and secure rooftop units on curbs and coordinate roof penetrations and flashing.
  - G. Perform field mechanical balancing in accordance with Section 230950: TESTING AND BALANCING OF MECHANICAL SYSTEMS.
  - H. The Mechanical Contractor shall own as part of his work, the following:

Provide one (1) additional drive set, if necessary, to obtain final design balancing requirements. The Mechanical Contractor shall coordinate with Balancing Firm and equipment manufacturer for drive selection, including belts and pulleys.

I. Provide certified factory start-up and written report on all units.

# 3.3 AUTOMATIC TEMPERATURE CONTROLS

- A. Coordination of control work with the BAS shall include, but not be limited to, the following items as described in Section 230900: ATC.
- B. Rooftop Energy Recovery Units:
  - 1. The following items shall be provided by the equipment manufacturer:

# AIR HANDLING EQUIPMENT

- a. Motor starters and overload protection.
- b. Control transformers.
- c. Energy wheel motor, speed controller, defrost controller and rotation failure contact.
- d. Dampers and damper motors.
- e. Terminal blocks for all wiring connections between equipment and control devices.
- f. Analog air filter differential pressure sensor, each filter bank.
- 2. The following items will be furnished by the BAS Contractor and installed by the equipment manufacturer:
  - a. DDC Controller.
  - b. Unit discharge air temperature sensor.
  - c. Heating and cooling coil discharge air temperature sensors.
  - d. Discharge humidity sensor.
  - e. Return air temperature sensor.
  - f. Return air humidity sensor.
  - g. Temperature sensor at exhaust air outlet.
  - h. Current sensor for one phase of power feeding the supply and exhaust fans.
- 3. The following items shall be field mounted and wired by the BAS Contractor:
  - a. Discharge air temperature sensor.
  - b. Discharge humidity sensor.
  - c. Heating coil discharge air temperature sensor.
  - d. Manual reset freezestat (supplied by ATC).
- C. The factory mounted DDC controllers shall be fully programmed with factory approved applications. Any modifications to these programs shall be done by factory trained personal or as approved by the DDC controls and unit equipment manufacturer.

The unit equipment manufacturer shall provide coordination for start-up, check-out, and test of the factory mounted DDC controllers and network devices including the protocol translator. Any hardware and software necessary including labor shall be provided by the unit equipment manufacturer.

The unit DDC controllers shall be networked to a standard protocol translator or gateway so system points shall be available for communications and control from the Building Automation System (BAS)/Automatic Temperature Controls (ATC) System. The protocols available from the protocol translator to the BAS/ATC System shall be BACNET (MSTP), LON or N2.

System points shall be configured to the BAS/ATC System by the BAS/ATC System Contractor. The mapping of points to the BAS/ATC front-end/PC shall be done by the BAS/ATC Contractor. Any software or hardware necessary including labor to accomplish this work shall be provided by the BAS/ATC System Contractor.

END OF SECTION 230760

## SECTION 230900: AUTOMATIC TEMPERATURE CONTROL

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Section 230200 and drawings are hereby made a part of this section as fully as if repeated herein.
  - B. The Mechanical Contractor shall coordinate with the work of Division 26 and the Fire Alarm System vendor for locations and mounting of all duct smoke detectors. These devices are shown on the Mechanical Drawings for reference only to show the intent of the work. All locations shall be determined based on approved shop drawings from the Fire Alarm System vendor and the Contractor for the work of Division 26, Electrical.

# 1.2 DESCRIPTION OF WORK

A. Provide labor, material and supervision necessary to install a complete direct digital control system of temperature controls to control all HVAC Systems, associated components and accessories as described herein. System to be an extension of the campus Johnson Controls DDC System.

## 1.3 SUBMITTALS

- A. Submit shop drawings and manufacturer's data sheets of all equipment.
- B. Submit manufacturer's certificates of conformance with applicable codes.
- C. Furnish point-to-point diagram of automatic temperature control system approval, including heating, ventilating and air conditioning equipment wiring diagrams where temperature control connections are required.
- D. Provide ten (10) copies of submittal data within thirty (30) days of contract award.
- E. Submittal shall consist of:
  - 1. System Architecture showing all digital actuated devices.
  - 2. Equipment lists of all proposed devices and equipment including data sheets of all products.
  - 3. Valve, damper and well and tap schedules showing size, configuration, capacity and location of all equipment.
  - 4. Data entry forms for initial parameters. Contractor shall provide English listing of all analog points with columnar blanks for high and low warning limits and high and low alarm limits, and a listing of all fan systems with columnar blanks for beginning and end of occupancy periods; and samples of proposed text for points and messages (for at least two systems of at least 15 points total) including sample 480 character alarm message. All text shall be approved prior to data entry.

- 5. Wiring and piping interconnection diagrams including panel and device power and sources.
- 6. Sketches of all graphics.
- 1.4 QUALITY ASSURANCE
  - A. Insure that all work and equipment is installed in accordance with manufacturer's warranty requirements.
  - B. Provide adequate supervision of labor force to assure that all aspects of specifications are being fulfilled.
  - C. The system shall be engineered, programmed and installed by personnel trained and regularly employed by the control's manufacturer.
  - D. Supplier shall have technical support to promptly respond within 24 hours or less to service calls to the site with technical staff, spare parts inventory and test and diagnostic equipment.
  - E. Codes and Approvals:
    - 1. The complete system installation shall be in strict accordance with national and local electrical codes. All devices designed for or used in line voltage applications shall be UL listed.
      - a. All microprocessor based devices shall be UL916 listed.
      - b. All electrical environmental control and monitoring devices shall be UL429 and/or UL873 listed.
    - 2. All electronic equipment shall conform to the requirements of FCC regulation Class B, Part 15, Section 15 governing radio frequency electromagnetic interference and be so labeled.
    - 3. The complete system shall conform to ANSI/ASHRAE Standard 135-2012, BACNET.
  - F. All system components shall be designed and built to be fault tolerant.
    - 1. Provide satisfactory operation without damage at 100% above and 85% below rated voltage and at +3 Hertz variation in line frequency.
    - 2. Provide static, transient, and short circuit protection on all inputs and outputs. Communication lines shall be protected against incorrect wiring, static transients and induced magnetic interference. Bus connected devices shall be A.C. coupled or equivalent so that any single device failure will not disrupt or halt bus communication.

# 1.5 ELECTRICAL WIRING

- A. All electrical wiring, components and accessories in connection with the Automatic Temperature Control System shall be furnished and installed by the control manufacturer.
  - 1. Electrical Contractor shall provide all wiring to duct smoke detectors.

- 2. Unless stated otherwise in the design documents, the ATC Contractor is responsible for providing control power to all valves, actuators, devices and components within the DDC System regardless of the selected voltage of those devices. This also includes all 120 volt power circuits required for devices, panels and control equipment.
- 3. The ATC Contractor shall be responsible for providing the control interface between terminal unit condensate pumps and their respective units at the required voltage of these devices in order to shut down the terminal unit in the event of high water level in the condensate pump receiver.
- B. Control wiring shall include all wiring necessary to interface with new and shall also include electric and electronic devices such as freezestats, electronic sensors, relays, flow switches and controlled devices such as valve and damper operators, electric actuated devices. Pilot devices such as ON/OFF switches and thermostats installed in series with line voltage circuits shall be considered to be control wiring.
- 1.6 AUTOMATIC TEMPERATURE CONTROL
  - A. Provide a DDC System of automatic temperature control which shall be as manufactured Johnson Controls, Inc., as installed by Modern Controls, Inc. Refer to description on bid documents for alternate manufacturers submission. The system shall be complete in all respects including labor, materials, equipment and services necessary.
  - B. All electrical wiring in connection with the installation of the automatic temperature control system shall be furnished and installed under the direct supervision of the control manufacturer.

# PART 2 – PRODUCTS

#### 2.1 TEMPERATURE SENSORS

- A. Solid state room sensors shall be of the wire wound resistance type element. Sensors shall be equipped with visual readout and adjustment. Sensors shall be of the completely solid state type with no moving contacts. Printed circuit board under thermostat cover shall contain a low mass resistance type setpoint dial and amplifier. Provide test points for measuring output voltage. Sensors shall be direct or reverse acting as required for the sequence of operation.
- B. Sensors shall provide the application for night setback override.
- C. Sensors shall be mounted at ADA height (48" above floor).
- 2.2 SMOKE DETECTORS
  - A. Duct type ionization smoke detectors shall be furnished by the Electrical Contractor and installed by the Mechanical Contractor in the supply and return air stream. The Electrical Contractor shall provide wiring from each detector to the Fire Alarm System panel.
  - B. The Electrical Contractor shall provide an alarm output signal from the FAS panel to the BAS for unit shutdown.

## 2.3 ACTUATORS

- A. Electronic actuators shall be sized to operate their appropriate dampers and valves with sufficient reserve power to provide smooth modulating action or two-position action as specified.
- B. Provide integral, auxiliary switches for direct coupled actuators to indicate when a desired position is reached or to interface additional controls for a specific sequence.
- C. Align actuator with drive shaft, provide permanent mark to identify closed position of end device.

# 2.4 SENSOR TRANSMITTERS

- A. Duct and immersion sensors shall have minimum spans as required to meet the temperature requirements. Duct sensors shall have sensing elements of sufficient length and accuracy to measure average duct temperature in each location.
- B. Sensors shall be of corrosion resistant construction, tamperproof, suitable for mounting on a vibrating surface. Exposed capillaries shall be temperature compensated, and armored or installed in protective tubing.
- C. All sensing elements for water pipe mounting shall be of the rod and tube type with linear output and shall be furnished complete with separable protecting wells filled with heat conductive compound. Sensors shall be factory calibrated and tamperproof. If easily adjustable sensors are provided, they shall be located inside metal enclosures with cylinder lock and key to prevent unauthorized setting.
- D. Safety Devices: Provide the following:
  - 1. Low limit, electric type, with 20' long serpentine element, with manual reset, set for 37°F for "freeze" protection and 55°F for fan discharge application, unless otherwise noted.
  - 2. Air and water duty flow switches: Differential pressure type for fan and pump status.
  - 3. Carbon monoxide sensor/transducer/meter shall be analog type, requiring no field or periodic calibration, suitable for wall mounting.
    - a. Microprocessor controlled digital display of 0 to 250 ppm CO.
    - b. Analog output of 4 to 20 milliamps.
    - c. UL listed housing, suitable for an operating environment of 0 to 125 F/ 10 to 90% RH.
    - d. Repeatability of +/- 10% at 50 ppm; linearity of +/- 10%.
    - e. Power input of 3.5 watts at 24 VAC.
    - f. Make: Macurco inc. model CM-2B.
    - g. Manufacturers: Air Test Technologies, Inc., Macurco, Rotronic Instrument Corp., Vaisala, Inc.

# 2.5 CONTROL VALVES

- A. Valves shall be rated for a minimum of 150 percent (150%) of system operating pressure at the valve location but not less than 125 psig.
- B. 2" and Smaller: Valves shall be bronze body with screwed or flared connections.

- C. 2-1/2" and Larger: Valves shall be bronze or iron body, flanged.
- D. Flow characteristics:
  - 1. Three-way valves shall have a linear relation of flow vs. valve position.
  - 2. Two-way valve position vs. flow relation shall be equal percentage for water flow control.
- E. Maximum pressure drop through valve:
  - 1. Modulating water flow control: 1/2 the pressure drop through the apparatus with maximum of 10 feet of water. Two position water valves shall be line size.
  - 2. Two-position steam control: 20 percent (20%) of inlet gauge pressure.
  - 3. Modulating steam control: 67 percent (67%) of inlet gauge pressure but not to exceed 45 percent (45%) of inlet absolute pressure (acoustic velocity limitation).

# 2.6 CONTROL DAMPERS

- A. The ATC Sub-contractor shall furnish all the controlled dampers of the type and sizes indicated on the drawings for installation by the sheet metal Sub-contractor.
- B. All 2-position control dampers shall be parallel blade and sized for minimum pressure drop, at the specified duct size.
- C. All modulating dampers shall be opposed blade and sized for an effective linear air flow control characteristics within the angle of rotation and maximum pressure drops specified. Information shall be provided to the sheet metal Subcontractor for determining the proper duct reductions or baffles used.
- D. Damper frames shall not be less than 16 gauge galvanized steel, formed with corner braces for extra strength, with mounting holes for enclosed duct mounting.
- E. All damper blades shall be of not less than 16-gauge galvanized steel formed for strength and high velocity performance. Blades on all dampers must not be over 8" in width. Blades shall be secured to 1/2" diameter zinc plated axles by zinc plated bolts and nuts. All blade bearings shall be nylon or oilite. Blade side edges shall be sealed off against spring stainless steel seals. Teflon coated thrust bearings shall be provided at each end of every blade to minimize torque requirements and insure smooth operation. All blade leakage hardware shall be constructed of corrosion resistant, zinc plated steel and brass.
- F. Dampers shall be suitable for operation between -40 and 200 degrees. The control manufacturer shall submit leakage and flow characteristics plus a size schedule for all controlled dampers.
- G. All blade edges shall have inflatable seal edging that shall be rated for leakage less than 10 cubic feet per minute per square foot of damper area at a differential pressure of 4" of water when the damper is being held by a torque not to exceed 50 inert lbs. Leakage shall not exceed 1/2 of 1% of total flow.

H. Provide permanent mark or scribe end of drive shaft to align damper with actuator in closed position.

## 2.7 CONTROL CABINETS

A. Control cabinets shall be constructed of 18-gauge steel with locking hinged door. Unless otherwise specified, all controllers, electric relays, switches and other equipment furnished as part of the control system which are not required to be mounted on mechanical equipment, shall be cabinet mounted. The temperature indicators and switches shall be flush mounted on the door tagged with plastic labels. All electrical devices shall be wired to a numbered terminal strip and all devices shall be completely adjusted and checked for proper operation prior to shipment to job site. All wiring shall be numbered according to the control diagram.

# 2.8 SEQUENCE OF OPERATION

- A. Rooftop Air Handling Unit Control
  - 1. The sequence that follows is for unit RTU-1. The unit consists of a supply fan, exhaust fan, variable frequency drive for each fan, energy recovery wheel and drive with rotation snesor, chilled water cooling coil, hot water heating coil, air filters, and air control dampers for return air, outside air and economizer. The exhaust air fan discharge is protected by a unit mounted backdraft damper.
    - a. The unit is a constant/variable volume system with economizer mode of operation.
    - b. Provide the unit with an individual DDC Controller. The DDC Controller shall be wired to sensors which shall include, but are not limited to, a discharge air temperature sensor, return air temperature sensor, exhaust air temperature sensor, global outside air temperature, coil air temperature sensors, and low limit thermostat.
  - 2. The existing BAS shall maintain operation of the unit according to its programmed schedule.
  - 3. Interface with the factory furnished actuators for each of the unit air control dampers.
  - 4. Interface with the airflow monitor transmitters from all terminal units in the zone with the variable speed drives on each fan.
  - 5. Provide three-way control valve and actuator for each of the cooling and heating coils.
  - 6. During the programmed occupied mode, the supply fan shall start and shall ramp up to its minimum scheduled airflow, with the fume hood exhaust fan off, in response to sum of the zone terminal units airflow monitors; coordinate with the sequence in article C.1 and C.2

The return air damper shall open, and the outside air and exhaust air dampers shall remain closed. Exhaust fan and energy wheel shall remain off. Delay opening the outside air damper until the zone temperature has recovered from its setback or setup temperature setting by modulating the control valves on the heating and cooling coils in sequence.

Once the zone temperature has been restored, operation shall continue as follows with the fume hood exhaust fan off.

- a. Return air and economizer dampers shall close, and the outside air damper shall open fully.
- b. The exhaust fan shall start and ramp up in speed through its variable speed drive to track the supply air fan according to its scheduled upper flow value.
- c. When the fans fail to start once activated, initiate an alarm to the system after a twenty second delay. Monitor fans status with a current sensor on one leg of power feeding the fan motors.

Whenever the fume hood exhaust fan is activated manually as described in article B.2, the system shall respond as follows.

- a. The supply fan shall ramp up in speed through its variable speed drive to its maximum scheduled airflow; the supply fan drive shall respond to the sum of airflows measured by the terminal units within the zone.
- b. The exhaust fan shall ramp down to its minimum scheduled airflow.
- c. When the fume hood exhaust fan is shut down, the system shall return to its original airflow configuration.
- 7. As the outside air damper opens, the energy recovery wheel shall start and preheat or precool outside air to the extent of its capacity. The heating hot water coil control valve shall modulate to maintain its leaving air temperature at 55°F, adjustable.
  - a. When the low limit thermostat (freeze stat) trips, de-energize the supply fan, exhaust fan, coil control valves and damper motors. When de-energized the damper motor shall spring return the outside air damper closed, the hot water control valve shall fail open to the coil. When the freeze stat trips, an alarm shall be generated at the OWS. Serpentine the element across the downstream face of the heating coil. Set at 40°F, adjustable.
  - b. Unit mounted rotation sensor shall activate an alarm to the system if the energy wheel fails to start once activated. The system shall monitor wheel discharge air temperature and alarm if it drops below 40°F, adjustable.
  - c. The heating hot water coil control valve shall modulate to maintain its leaving air temperature at 55°F, adjustable, to compensate for the failed wheel condition until operation of the energy recovery wheel is restored.
- 8. On a rise in the unit discharge air temperature above 60°F, adjustable, the chilled water coil control valve shall modulate to maintain discharge air temperature of 55°F, adjustable. On a fall in temperature the reverse shall occur. Whenever the return air temperature at the unit is within 5°F, adjustable, of the outside air temperature, the energy recovery wheel shall stop and the unit economizer damper shall open fully. When the outside air temperature rises above 75°F, adjustable, the unit economizer damper shall close, and the energy recovery wheel shall start once again.

- 9. During the programmed un-occupied mode, the unit shall shut down. The return air damper shall open full, and the outside air and exhaust air dampers shall close. The exhaust fan and energy recovery wheel shall remain off.
  - a. The supply fan shall ramp up to its minimum flow setting through its drive, the heating and cooling coil control valves shall modulate to maintain average zone un-occupied temperatures of 60°F (heating) and 85°F (cooling), all adjustable, by monitoring room temperature sensors. The outside air and exhaust air dampers shall remain closed, exhaust fan off, and energy wheel off.
  - b. Whenever the outside air temperature is at or below 35°F, adjustable, the control valves on the heating and cooling coils shall open full to the coils to prevent freezing of the coils.
- 10. Interface with a common fire alarm input from the fire alarm system. The fire alarm contact shall be provided at the fire alarm panel by the Division 26 Contractor. The status of the alarm contact shall be communicated throughout the BAS. When the fire alarm contact indicates an alarm condition, the BAS shall de-energize the unit. When de-energized, the damper motors shall spring return all air dampers closed. Provide an alarm at the OWS to indicate fire alarm status.
- 11. The Mechanical Contractor shall install duct smoke detectors in the supply and return air ducts at the unit as furnished by the Division 26 Contractor. When wired to the fire alarm system as required by the Division 26 Contractor, the duct smoke detectors shall alarm the FAS and shut down the unit upon activation of the smoke detectors in a manner similar to item 10.
- 12. The following items shall be displayed at the OWS:
  - a. Zone space temperatures.
  - b. Heating and cooling coil discharge air temperatures.
  - c. Discharge air temperature setpoint.
  - d. Return air temperature.
  - e. Rotation sensor alarm on the energy wheel.
  - f. Global outside air temperature.
  - g. Fire alarm system status/alarm.
  - h. Duct smoke detectors status: normal/alarm.
  - i. Commanded status of fans.
  - j. Supply fan operational status/alarm via current sensor.
  - k. Exhaust fan operational status/alarm via current sensor.
  - 1. Fan drive status via frequency feedback on each fan VFD.
  - m. Freeze stat status/alarm.
  - n. Diagram showing the layout of the equipment with major components and dynamic temperatures shown where temperature sensors exist in the system.
- B.1 Room Exhaust Fan Control
  - 1. The sequence that follows is typical for units EF-1, EF-2, and EF-4.
  - 2. Each exhaust fan shall be energized by means of a manual switch mounted in the room served by each fan, as part of the work of Division 26 Electric.

- 3. Provide motor operated damper and actuator for each exhaust fan as shown on the drawings. The damper shall be installed by the Mechanical Contractor.
- 4. Subject to a limit switch on the exhaust air damper actuator, the fan shall run continuously once activated.
- 5. Provide a current sensor on one phase of power feeding the fan for status indication at the OWS. Provide an alarm if the fan is commanded on and flow is not proven after a 20-second delay. Provide an alarm light adjacent to the fan control switch with a red/white/red laminated placard which reads: "FAN FAILURE ALARM WHEN ILLUMINATED" in minimum 3/8" high letters.
- 6. Interface with a common fire alarm input to the BAS from the fire alarm system (FAS). When the FAS indicates an alarm condition, the BAS shall de-energize the fan if activated and close the exhaust air damper.
- 7. The following items shall be displayed at the OWS:
  - a. Fan status via current sensor: on/off/alarm.
  - b. Commanded status of fan and damper.
- B.2 Fume Hood Exhaust Fan Control
  - 1. The sequence that follows is for unit EF-3.
  - 2. The exhaust fan shall be energized by means of a manual switch mounted on the face of the fume hood as part of the work of Division 26 Electric.
  - 3. Interface with the motor operated bypass damper furnished with the exhaust fan; set the open position of the bypass damper in accordance with the fan manufacturer's written instructions and the bypass airflow scheduled on the drawings.
  - 4. Provide motor actuator for the fan isolation damper furnished with the exhaust fan as shown on the drawings.
  - 5. Subject to a limit switch in the exhaust air isolation damper actuator, the fan shall run continuously once activated.
  - 6. Provide a current sensor on one phase of power feeding the fan for status indication at the OWS. Provide an alarm if the fan is commanded on and flow is not proven after a 20-second delay. Provide an alarm light adjacent to the fan control switch with a red/white/red laminated placard which reads: "FAN FAILURE ALARM WHEN ILLUMINATED" in minimum 3/8" high letters.
  - 7. Once the exhaust fan is activated, coordinate with the work described in article C.1 for the room air terminal.
  - 8. Interface with a common fire alarm input to the BAS from the fire alarm system (FAS). When the FAS indicates an alarm condition, the BAS shall de-energize the fan if activated and close the exhaust air damper.

- 9. The following items shall be displayed at the OWS:
  - a. Fan status via current sensor: on/off/alarm.
  - b. Commanded status of fan and its dampers.
- C.1 VAV Terminal Unit Control
  - 1. The sequence that follows is for terminal unit VAV-1.
  - 2. Provide control voltage transformer 120/24VAC on a junction box provided as part of the work of Division 26 Electric, for control power to all similar terminal unit controls. Coordinate with location shown on the electrical drawings.
  - 3. Provide wall-mounted temperature sensor, controller, and two-way control valve and actuator for the terminal unit.
  - 4. On a rise in space temperature, modulate the two-way heating coil control valve closed to coil.
  - 5. On a continued fall in space temperature, the two-way heating control valve shall modulate open to coil to maintain room temperature at 75°F, adjustable.
  - 6. The terminal unit air valve shall maintain minimum airflow according to its scheduled value. Whenever the fume hood exhaust fan EF-3 is activated manually, the air valve shall open to its maximum scheduled value. When the exhaust fan is shut down, the reverse shall occur.
  - 7. The following items shall be displayed at the OWS:
    - a. Space temperature.
    - b. Coil leaving air temperature.
    - c. Terminal unit airflow.
- C.2 CAV Terminal Unit Control
  - 1. The sequence that follows is typical for terminal units CAV-1 and CAV-2.
  - 2. Extend control power from transformer described in article C.1 to each terminal unit controls.
  - 3. Provide wall-mounted temperature sensor, controller, and two-way control valve and actuator for the terminal unit.
  - 4. Maintain terminal unit air damper at its scheduled flow. On a rise in space temperature, modulate the two-way heating coil control valve closed to coil.
  - 5. On a fall in space temperature, the two-way heating control valve shall modulate open to coil to maintain room temperature at 75°F, adjustable.

- 6. The following items shall be displayed at the OWS:
  - a. Space temperature.
  - b. Coil leaving air temperature.
  - c. Terminal unit airflow.

## PART 3 – EXECUTION

#### 3.1 INSTALLATION

- A. Install system and materials in accordance with manufacturer's instructions and roughing-in drawings, and details and drawings. Install electrical work and use electrical products complying with requirements of these specifications. Mount controllers at convenient locations and heights.
- B. All wiring shall be properly supported and run in a neat and workmanlike manner. All wiring exposed and in equipment rooms shall run parallel to or at right angles to the building structure. All piping and wiring within enclosures shall be neatly bundled and anchored to prevent obstruction to devices and terminals. All wiring shall be in accordance with all local and national codes. Low voltage wiring for space temperature sensors, communication bus between terminal units, etc., above accessible ceilings in finished spaces on the floors may be plenum rated cable. Wiring in all other locations shall be installed in EMT conduit. All electronic wiring shall be #18 AWG minimum THHN and shielded if required, except standard network (Ethernet, LonWorks, etc.) cabling shall be as tested and recommended in lieu of #18 gauge twisted, #22 or #24 gauge is acceptable if used as a part of an engineered structured cabling system. The control manufacturer must submit technical and application documentation demonstrating that this cabling system has been tested and approved for use by the manufacturer of both the control system and the engineered structured cabling system.
- C. Provide all sensing, control, and interlock wiring for the following:

System inputs and outputs System communications System power System interlocks Unit controls

D. The Control Manufacturer shall enter all computer data into the Host computer including all graphics, control programs, initial approved parameters and settings, and English descriptors. The Control Manufacturer shall maintain diskette copies of all data file and application software for reload use in the event of a system crash or memory failure. One copy shall be delivered to the owner during training sessions, and one copy shall be archived in the Control Manufacturer's local software vault.

# 3.2 DATA CONTROL (D/C) AND GRAPHICS SUMMARY

A. All hardware, custom software, application software, graphics, etc., necessary to accomplish the control sequences and display the graphics specified shall be provided as part of this contract. Provide all controllers, inputs, outputs, valves, dampers, actuators and flow meters required to provide the control and graphic data described. Provide software setpoints required for display in logical groups and graphics.

- B. Each digital output shall have a software-associated monitored input. Any time the monitored input does not track its associated command output within a programmable time interval, a "command failed" alarm shall be reported.
- C. Where calculated points (such as CFM) are shown, they shall appear in their respective logical groups.
- D. Unless otherwise specified or approved prior to bidding, the primary analog input and the analog output of each DDC loop shall be resident in a single remote panel containing the DDC algorithm, and shall function independent of any primary or UC communication links. Secondary (reset type) analog inputs may be received from the primary network, but approved default values and/or procedures shall be substituted in the DDC algorithm for this secondary input if network communications fail or if the secondary input becomes erroneous or invalid.

# 3.3 ACCEPTANCE

- A. The Control Manufacturer shall completely check out, calibrate and test all connected hardware and software to insure that the system performs in accordance with the approved specifications and sequences of operations approved.
- B. Witnessed acceptance demonstration shall display and demonstrate each type of data entry to show site specific customizing capability; demonstrate parameter changes; execute digital and analog commands; and demonstrate DDC loop stability via trend of inputs and outputs.

# 3.4 MANUALS

- A. The following manuals will be provided:
  - 1. An Operators Manual shall be provided with graphic explanations of keyboard use for all operator functions specified under Operator Training.
- B. Computerized printouts of all GPC data file including all point processing assignments, physical terminal relationships, scales and offsets, command and alarm limits, etc.
- C. A manual shall be provided including revised as-built documents of all materials required under the paragraph "SUBMITTALS" on this specification.
- D. Two Operators Manuals, and two As-Built Manuals shall be provided to the owner.
- 3.5 TRAINING
  - A. All training shall be by the BMCS contractor and shall utilize operators manuals and as-built documentation.
  - B. Operator training shall include a one-hour sessions encompassing modifying text and graphics, sequence of operation review, selection of all displays and reports, use of all specified OWS functions, troubleshooting of sensors (determining bad sensors), and password assignment and modification. One training session shall be conducted at system completion, one shall be conducted forty five days after system completion, and one at ninety (90) days, or as requested by the Owner..

## 3.6 SERVICE GUARANTEE

A. The control system herein specified shall be free from defects in workmanship and material under normal use and service. After completion of the installation, the control manufacturer shall regulate and adjust all thermostats, control valves, motors and other equipment provided under this contract. If within twelve (12) months from date of acceptance either for beneficial use of final acceptance, whichever is earlier, any of the equipment herein described is proven to be defective in workmanship or materials, it will be replaced or repaired free of charge. The control manufacturer shall, after acceptance, provide any service incidental to the proper performance of the control system under guarantee outlined above for the period of one year. Normal maintenance of the system or adjustments of components is not to be considered part of the guarantee. The control manufacturer will upon completion of the installation, during the warranty period, make available to the Owner, an annual service agreement covering all labor and material required to efficiently maintain the control system.

#### 3.7 FINAL ADJUSTMENT

- A. After completion of installation, adjust thermostats, control valves, motors and similar equipment provided as work of this section.
- B. Final adjustment shall be performed by specially trained personnel in direct employ of installer of primary temperature control system.

## END OF SECTION 230900

## SECTION 230950: TESTING & BALANCING OF MECHANICAL SYSTEMS

#### PART 1 – GENERAL

- 1.1 JOB CONDITIONS
  - A. Systems shall be completely installed and in continuous operation as required to accomplish the tests.
  - B. Heating, ventilating and air conditioning equipment shall be completely installed and in continuous operation as required to accomplish the balance work specified.
  - C. Adjust and balance shall be performed when outside conditions approximate design conditions indicated for heating and cooling functions.
  - D. Make at least two inspections of the mechanical systems during construction to verify that balancing procedures may be accomplished. Report findings to the Architect/Engineer/Construction Manager.
  - E. Balancing firm shall balance Mechanical System two (2) times. The first time shall be considered a rough balance. Any discrepancy in air flow shall be addressed to the Architect/Engineer/Construction Manager. The final balancing will be accomplished after review of rough balance reports.
  - F. The final balancing reports shall be submitted and approved prior to project's being considered complete; i.e., commencement of warranties.
- 1.2 ENGINEER QUALIFICATIONS
  - A. The firm shall be an independent organization having no affiliation with construction contractors, equipment sales or design engineering.
  - B. The firm shall specialize in balancing heating, ventilating and air conditioning systems.
  - C. The firm shall show proof of having balanced and tested at least five projects of similar size and scope.
  - D. All field work shall be under the direct supervision of a registered Professional Engineer who is a full-time employee of the balancing firm.
  - E. The firm shall be certified by and a member of the AABC (Associated Air Balance Council), or NEBB (National Environmental Balancing Bureau).
- 1.3 REPORT
  - A. Data Sheets:
    - 1. Submit data sheets on each item of testing equipment required.
    - 2. Include name of device, manufacturer's name, model number, latest date of calibration and correction factors.

- B. Report Forms:
  - 1. Submit specimen copies of report forms.
  - 2. Forms shall be 8-1/2 x 11 inch paper for loose-leaf binding, with blanks for listing of the required test ratings and for certification of report.
  - 3. Reports shall be on standard forms published by AABC or NEBB.

# PART 2 – PRODUCTS

- 2.1 AIR BALANCE INSTRUMENTS
  - A. Alnor Velometer with probes and alnor pitot tube.
  - B. Rotating Vane Anemometer: 4 inch size.
  - C. ASHRAE Standard Pitot Tubes, stainless steel 5/16 inch outside diameter, lengths 18 inches and 36 inches.
  - D. Magnehelic Differential Air Pressure Gauges, 0 to 0.5 inches, 0 to 1.0 inch and 0 to 5.0 inches water pressure ranges, each arranged as a portable unit for use with a standard Pitot tube.
  - E. Combination Inclined-Vertical Portable Manometer, range 0 to 5.0 inches water.
- 2.2 WATER BALANCING INSTRUMENTS
  - A. 30 Inch Mercury U-Tube Manometer, 200 psig, with 3 valve bypass assembly and return wells or mercury check valves.
  - B. Inspector's gauge testing set.
  - C. Water Differential Pressure Gauge, 4-1/2 inch dial, 0 to 100 psi range.
  - D. Pressure gauge measurement points, quick connect couplings, 1/4 inch psi.
- 2.3 SYSTEM PERFORMANCE MEASURING INSTRUMENTS
  - A. Insertion Thermometers, with graduation at 0.5 degrees F for air and 0.1 degrees F for water.
  - B. Sling Psychrometer.

# PART 3 – EXECUTION

- 3.1 GENERAL REQUIREMENTS
  - A. Arrange and pay for all tests.

# **TESTING & BALANCING OF MECHANICAL SYSTEMS**

- B. Notify Construction Manager at least three working days in advance of test and conduct in presence of Architect/Engineer/Construction Manager.
- C. Tests to be performed prior to insulation, covering or concealment.
- D. Provide signed report of completion of test with signature of witnesses. Report shall indicate:
  - 1. System Tested
  - 2. Date
  - 3. Specified test requirements and actual testing results
- E. The balancing firm shall report to and review the work required with the Architect/Engineer before beginning field balance work. The balancing firm shall make at least two inspections of the air systems during construction and shall report his findings in writing to the Architect/Engineer.
- F. The balancing firm shall cooperate with the Architect/Engineer/Construction Manager and the Mechanical Contractor to effect smooth coordination of the balancing work with the job schedule.
- G. The balancing firm shall be responsible for getting the various systems into proper operation. They shall enlist the aid of the equipment suppliers and Mechanical Contractor as may be required to effect proper operation consistent with the contract plans and specifications.
- H. When the balancing firm cannot balance a belt-driven piece of equipment with the supplied belts and sheaves, inform the Mechanical Contractor that the Mechanical Contractor shall provide additional sheaves as spelled out in other Division 23 Sections.
- 3.2 CIRCULATING WATER SYSTEM TEST
  - A. All piping tests shall be applied not only to piping, but also to all devices and equipment connected thereto with the exception of control valves, boilers or any other equipment which may be damaged by the test pressure. All valves shall be full open.
  - B. Test at 100 psi hydrostatic pressure for 6 hours:
    - 1. Record pressures each hour
    - 2. Repair all leaks
    - 3. Retest until 6 hours can be completed with no leaks or loss of pressure.
  - C. After completion of successful test, strainers shall be cleaned, then system shall be backflushed and strainers cleaned again.
- 3.3 DUCTWORK TESTING
  - A. Witness testing conducted by the Mechanical Contractor per Section 230600, PART 3: EXECUTION.
- 3.4 BALANCING PROCEDURE
  - A. Air System Balance:

1. With the fan supply system set to handle normal minimum outdoor air, the balancing firm shall perform the following tests and compile the following information:

Air Handling Equipment

- a. Design Conditions:
  - (1) CFM Supply Air
  - (2) Static Pressure
  - (3) CFM Fresh Air
  - (4) Fan RPM
- b. Installed Equipment:
  - (1) Manufacturer
  - (2) Size/Model Number
  - (3) Motor HP, Voltage, Phase, Full Load Amperes
- c. Field Test:
  - (1) Fan Speed
  - (2) No Load Operating Amperes
  - (3) Fan Motor Operating Amperes
  - (4) Calculated BHP
- d. Test for Total Air:
  - (1) Size of discharge, return air and outside air ducts.
  - (2) Number and locations of Velocity Readings taken.
  - (3) Duct Average Velocity
  - (4) Total CFM
  - (5) Outside Air CFM
  - (6) Return Air CFM
- e. Individual Outlets (Diffusers, Registers and/or Grilles):
  - (1) Identify each outlet or inlet as to location and area and fan system
  - (2) Outlet, manufacture and type
  - (3) Outlet size
  - (4) Outlet free area, core area, or neck area
  - (5) Required FPM and test velocity found for each outlet.
  - (6) Required CFM and test results for each outlet
- f. Test for room/space pressurization
  - (1) As noted on the drawings or as required, final balancing shall include room/space pressure adjustments
  - (2) As confirmed in writing by the Engineer, the supply, return, and/or exhaust air shall be

adjusted to required pressure relationship (positive, neutral, negative) while maintaining required total air changes.

- 2. After completion of tests, adjustment and balancing under minimum fresh air conditions, set the system for 100% fresh air. Repeat the total CFM tests to check field versus design conditions. The results under 100% fresh air cycle shall agree with conditions found under "minimum fresh air operation" before the system is considered to be in balance. Adjustments of the proper dampers shall be made to achieve balance.
- 3. Testing and adjusting of individual outlets shall be performed under procedures recommended by the manufacturers of the outlets. All outlets shall be set for air pattern required and all main supply air and return air dampers to be adjusted and set for design CFM indicated. Any required changes in air patterns, settings, etc., necessary for achieving correct air balance, shall be provided by this Contractor. Total CFM of all outlets shall agree with total CFM of all branches and the grand total shall agree with the air volume for the fan(s).
- B. Water Balance:
  - 1. Water balance shall include heating water, chilled water and condenser water systems. The balancing agency shall perform the following tests, compile data and submit reports.
  - 2. Heating and/or Cooling Elements Including Loop Water to all terminal Units:
    - a. Design Data:
      - (1) MBH Specified, GPM Specified
      - (2) Entering Water Temperature (EWT)
      - (3) Entering Air Temperature (EAT)
      - (4) Water Temperature Drop (DTW)
      - (5) Element Type Specified
    - b. Field Test:
      - (1) Identify each element as to location
      - (2) Required water temperature drop corrected for item (3) above
      - (3) Actual entering air and water conditions (temperature and GPM)
      - (4) Adjust element until required temperature drop is obtained
- C. In addition to the above work, the Balancing Firm shall check the operation of all automatic temperature control equipment; verify all thermostat, aquastat, etc., set-points and operations; and enlist the aid of the Mechanical Contractor and the Control Subcontractor to make necessary adjustments where required.

# END OF SECTION 230950

## SECTION 260000: GENERAL PROVISIONS – ELECTRICAL

#### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the work of this Section.
- B. The specification or drawing and the design features or resulting construction disclosed, are the property of Furlow Associates, Inc., and shall not be reproduced without written permission.

# C. Refer to Section 078413 for Through-Penetration Firestop Systems.

# D. Refer to Section 083113 for Access Doors and Frames

#### 1.2 DESCRIPTION OF WORK

- A. Provide all materials, equipment, labor, services and all appurtenances required to completely install and satisfactorily operate the various systems. The items listed below are for general guidance only and do not necessarily include the entire requirements for the project.
  - 1. Coordination with other trades
  - 2. Interior feeders
  - 3. Power panels
  - 4. Lighting branch wiring
  - 5. Power wiring
  - 6. Lighting fixtures and lamps
  - 7. Wiring devices
  - 8. Connections for electrically operated equipment
  - 9. Fire alarm and detection system
  - 10. Telephone/Data raceway system
  - 11. Related work as herein described or otherwise defined under the heading "Related Work".
- B. Wherever the term "provide" is used, it shall be understood to mean both "furnish" and "install".

# 1.3 RELATED WORK

- A. Equipment specified in sections of Divisions 1 thru 23 that require electric power supply.
- B. Work related to this trade as defined on the following contract drawings:

Architectural/Structural HVAC Plumbing

#### 1.4 SITE CONDITIONS

A. Attention of all bidders is called to the necessity for a careful inspection of the site, its present condition and encumbrances, the extent of the work, the protection to be afforded to adjacent properties or structure, availability of utilities, the extent and nature of the material required to be excavated and the amount of fill and removal. He shall also determine local or site limitations which will affect construction.

# 1.5 PERMITS, INSPECTIONS AND ORDINANCES

- A. All work shall be executed and inspected in accordance with local and state ordinances, rules and regulations and the requirements of public utilities having jurisdiction. The contractor shall secure and pay for all permits, inspections and connections required.
- B. The Electrical Contractor shall furnish a certificate of inspection to the Owner at the time of completion.
- C. Requirements of the following organization shall be considered minimum:
  - 1. National Electrical Code
  - 2. National Electrical Safety Code
  - 3. OSHA
  - 4. Local City and County Codes
- D. Reference to technical societies, trade organizations and governmental agencies are in accordance with the following:
  - 1. ANSI American National Standards Institute
  - 2. ASTM American Society for Testing Materials
  - 3. IEEE Institute of Electrical and Electronics Engineers, Inc.
  - 4. NEC National Electrical Code
  - 5. NEMA National Electrical Manufacturer's Association
  - 6. NFPA National Fire Protection Association
  - 7. MSS Manufacturer's Standardization Society
  - 8. IES Illuminating Engineers Society
  - 9. ETL Engineering Testing Laboratories
  - 10. EIA Electronic Industries Association
  - 11. OSHA Occupational Safety and Health Administration
  - 12. Federal Specifications
  - 13. UL Underwriters Laboratories, Inc.
- 1.6 QUALITY ASSURANCE
  - A. Provide adequate supervision of labor force to assure that all aspects of the contract documents are fulfilled.

B. Contractor to provide manufacturer's written certification that the following equipment has been installed and will operate correctly and in accordance with the manufacturer's warranty requirements.

Fire Alarm and Detection System

- C. Testing:
  - 1. After completion of the work, the entire wiring system shall test entirely free from grounds, short circuits, opens, overloads and improper voltage.
  - 2. The grounding system shall be tested for a resistance of 25 ohms or less.
  - 3. Perform testing as follows: Arrange and pay for all tests, provide all equipment, materials and labor to perform test. Notify Engineer and Owner three (3) working days before tests are to be made. Conduct tests in the presence of the Engineer or authorized representative. Repeat tests after defects are corrected.
- D. Special Engineering Services: In the instance of complex specialized electrical power and signaling systems, and other similar systems, the installation and final connections of these systems shall be made by and/or under the supervision of a competent installation and service engineer who shall be a representative of the respective equipment manufacturer. Any and all expenses of these installation and service engineers shall be borne by this Contractor.

# 1.7 COORDINATION

- A. As a requirement of this project, the Electrical Contractor shall furnish coordination for his equipment and layouts with other subcontractors furnishing equipment and services for Divisions 1 thru 23. Any and all contractors who install their equipment or furnish services prior to coordination, any contractor who changes their equipment or services after coordination has occurred, without notifying associated subcontractors, shall be held responsible for making all required changes with no additional cost to the Owner. Or delay in construction time. This coordination will include conduit layout to allow access to equipment for maintenance.
- B. The Mechanical, Plumbing and Electrical Contractors are responsible to coordinate all manufacturer's recommended circuit breakers, starters, disconnects and fuse sizes for all equipment. Submission of a shop drawing will certify that this has been completed.
- C. The drawings and specifications reflect the type, number and size of services required for the equipment the design is based upon. Should the supplying subcontractor elect to furnish an alternate piece of equipment requiring difference services and/or space conditions, he shall inform the subcontractor furnishing those services and be held responsible to pay for all required changes as part of this contract.
- 1.8 SUBMITTALS
  - A. Shop Drawings:
    - 1. Shop drawings shall be submitted in accordance with Division 1 of these specifications except where herein modified.

# **NOTE:** Submittals will only be reviewed once and resubmittals will be reviewed once. Any other submittals will be billed to the Contractor at the Engineer's standard rates.

- 2. Shop drawings comprising complete catalog cuts, performance test data for electrical equipment as required by other sections of Division 26 shall be submitted for review checking. The Contractor shall review these shop drawings for conformance to contract documents prior to submission and affix contractor's signature to each submittal certifying that this review has been done. By approving and submitting shop drawings, product data, wiring diagrams and similar materials, the Electrical Contractor represents that he and/or his subcontractor has determined and verified materials, field measurements and field construction data that relates to the work, and has checked and coordinated this information with all of the Divisions 1 thru 23 subcontractors.
- 3. All shop drawing submittals shall have the following identification data, as applicable, contained therein or permanently adhered thereto:
  - a. Project name
  - b. Project number
  - c. Sub-Contractor's, Vendor's and/or manufacturer's name and address.
  - d. Product identification.
  - e. Identification of deviation from the contract documents.
  - f. Applicable contract drawings and specification section number.
  - g. Shop drawing title, drawing number, revision number, and date of drawing and revision.
  - h. Resubmit revised or additional shop drawings as requested.
  - i. Wherever shop drawings or vendor's standard data sheets indicate work to be done "by others", it shall be the responsibility of the Contractor making the submission to identify by name, the Contractor who is to do this work. If the Contractor named is other than the Contractor making the submission, the shop drawing submission must be reviewed by the named Contractor and bear his mark of approval, prior to submission to the Architect/Engineer.
  - j. Where equipment proposed differs from that shown on the drawings or specified, he shall submit for approval drawings showing the manner in which the layout is affected by the substitution.
  - k. The Contractor shall keep one copy of approved shop drawings at the job site, filed in a suitable metal container. The shop drawings shall be cataloged and kept in good repair, and shall be available for use by the Owner, Architect and Engineer.
  - 1. No equipment shall be ordered, fabricated, etc., before approval of shop drawings.

## 1.9 SUBSTITUTIONS

- A. Whenever a material, article, piece of equipment or system is identified in the following specification or indicated on the drawings by reference to manufacturers' or vendors' names, trade names, catalog numbers or the like, it is so identified for the purpose of establishing the basis of the Bid.
- B. Substitution approval must be obtained and included as an addendum item prior to the submission of the bid. An approved substitution shall not be considered as an approval for the contractor or an equipment vendor to deviate from the written portion of the specifications unless so stated in the addendum.
- C. The drawings illustrate the space allocated for equipment and the Contractor shall install the equipment accordingly. If changes are required in the building or arrangement due to substitution of equipment, the Contractor making the substitution must pay for the necessary modifications.
- D. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents. This shall include, but shall not be limited to space requirements, code clearances, the type, horsepower, capacities, number and size of services required from other trades, including all required ancillary items furnished and installed by other trades. If the manufacturer or related bidding contractor does not comply with these requirements, then they shall be responsible for any and all additional costs associated with the changes required by other trades.

# 1.10 LUBRICATION

- A. Furnish, install and maintain all required lubrication of any equipment operated prior to acceptance by the Owner. Lubrication shall be as recommended by the equipment manufacturer.
- B. Provide one year's supply of lubricants to Owner at date of acceptance.
- C. Verify that required lubrication has taken place prior to any equipment start-up.
- 1.11 ADJUSTMENT & CLEANING
  - A. Adjust and clean equipment to be placed in proper operation condition.
- 1.12 EQUIPMENT START-UP
  - A. Verify proper installation by manufacturer or his representative.
  - B. Advise General Contractor 2 days prior to actual start-up.
  - C. Verify proper operation. Obtain signed statement by manufacturer or his representative that equipment is operating within warranty requirements. Submit statement to General Contractor.
- 1.13 OPERATION AND MAINTENANCE INSTRUCTIONS
  - A. Properly and fully instruct Owner's personnel in the operation and maintenance of all systems and equipment.

- B. Insure that the Owner's personnel are familiar with all operations to carry on required activities.
- C. Such instruction shall be for each item of equipment and each system as a whole.
- D. Provide report that instruction has taken place. Include in the report the equipment and/or systems instructed, date, contractor, Owner's personnel, vendor, and that a complete operating and maintenance manual has been reviewed.
- E. Manual shall include all instructions on operation, maintenance, repair parts list, lubrication requirements, brochures, catalogue cuts, wiring diagrams, piping diagrams, control sequences, service requirements, names and addresses of vendors, suppliers and emergency contacts. Three manuals shall be provided.
- F. Submit manuals for review prior to operating instruction period. Manuals shall be 8-1/2 x 11" with hard cover, suitably bound.

# 1.14 TOOLS

A. All equipment furnished by the Contractor which requires special tools or devices other than those normally available to the maintenance or operating staff shall be furnished in duplicate to the Owner, sufficiently marked, packed or boxed for staff usage. The tools provided shall be listed by the Contractor identified as to their use or the equipment applicable in a written transmittal to the Owner.

#### 1.15 CLEANING AND FINISHING

A. After equipment start-up and all operating tests have been made and the system pronounced satisfactory, each respective Contractor shall go over the entire project, clean all equipment, etc., installed by him and leave in a clean and working condition. Any surfaces found marred after this final cleaning shall be refinished or replaced by each Contractor at no cost to the Owner.

# 1.16 OPERATING AND MAINTENANCE MANUALS

A. Three complete sets of instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished to the Architect. Each set shall be furnished before the contract is completed. The following identification shall be inscribed on the covers: the words "OPERATING AND MAINTENANCE INSTRUCTIONS", the name and location of the building, the name of the Contractor and the name of the Architect and Engineer. Flysheet shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8-1/2 by 11 inches, with large sheets of drawings folded in. The instructions shall include, but shall not be limited to, the following:

Approved wiring and control diagrams, with data to explain the detailed operation and control of each component.

A control sequence describing start-up, operation and shutdown.

Operating and maintenance instructions for each piece of equipment, including lubrication instructions.

Manufacturer's bulletins, cuts and descriptive data.

Parts lists and recommended spare parts.

- 1.17 SERVICE INTERRUPTION
  - A. All service interruptions to the electric or related systems, whether during regular working hours or at any other time, must be coordinated with the Owner. All such interruptions shall be so scheduled and planned as to require a minimum of time and shall occur only during a mutually satisfactory period.

# 1.18 INTERPRETATION OF SYSTEMS

A. The interpretation of the Architect will be final in the event there is a lack of understanding of the full scope or requirements of the systems under this contract.

# 1.19 LAYOUTS

A. On small scale drawings, i.e., 1/8" - 1'-0", the approximate location of the electrical branch circuit items such as receptacle, telephone, grounding and equipment outlets are shown to indicate their existence. The exact location of these items and their related raceways are governed by structural conditions, coordination with the work of other trades and the Architect's final decision. By accepting a contract, the Contractor agrees to install the work in accordance with the above statement and within the contract price.

# PART 2 – PRODUCTS

## 2.1 MATERIAL

- A. All material shall be new and of good quality. Material shall conform to all accepted trade standards, codes, ordinances, regulations, or requirements governing same, and shall be approved before being installed.
- B. The Architect reserves the right to require the Contractors to submit samples of any or all articles or materials to be used on the project.
- C. Where any device or equipment is herein referred to in the singular number, such as "the panel", this reference shall be deemed to apply to as many such devices or equipment as are required to complete the installation as shown on the drawings or specified.
- D. All materials and equipment used in the work shall comply with the standards of recognized authorities such as UL, NEMA, IEEE, ETL, IES and EIA in every instance where such standards have been established for the particular type of materials to be installed.
- E. All similar pieces of equipment or materials of the same type or classification used for the same purpose shall be of the same manufacturer.
- F. All manufactured equipment shall have factory applied finishes.

## 2.2 WARRANTY

A. Wherever in the specification sections of this division, reference is made to a specific warranty period, this warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the contract documents.

## PART 3 – EXECUTION

# 3.1 INSPECTION

A. Prior to performing the work, examine areas and conditions; check and verify all dimensions, under which the work is to be installed and notify the Architect in writing of conditions and dimensions detrimental to the proper and timely completion of the work. Do not proceed until authorization is given by the Architect.

# 3.2 LAYING OUT WORK

A. The Contractor is responsible for the accuracy of all lines, elevations, and measurements, grading and utilities and must exercise proper precaution to verify figures shown on drawings before laying out work and will be held responsible for any error resulting from his failure to exercise such precaution.

# 3.3 WORKMANSHIP

A. Install all work neat, trim, parallel and plumb with building lines in accordance with standard trade practice acceptable to the Architect.

# 3.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect all equipment and materials from damage during transportation, storage and installation.

# 3.5 PROTECTION

A. Protect all work, equipment and materials during construction up to the time of acceptance by the Owner.

Arrange and design the protection to prevent damage from infiltration or dust, debris, moisture, chemicals and water. Cap or plug electrical raceways.

- B. Protect all surfaces against damage from welding, cutting, burning, or similar construction functions. This protection shall be accomplished by care in operations, covering and shielding. Special care is directed to exposed finished masonry, metal or wood surfaces and painted surfaces. Corrective measures required shall be accomplished by the trade which made the original installation when and as directed by the Architect at the expense of the Contractor.
- C. Cover and protect all lighting fixtures as may be necessary until completion of the work. Replace damaged fixtures or damaged fixture parts as directed by the Architect at no cost to the Owner.
- D. Do not install devices, polished metal fittings or parts until adjoining tile or masonry work is completed.

E. Maintain and replace protective covering when so directed by the Architect until the work is ready for acceptance.

# 3.6 CUTTING & PATCHING

- A. Furnish information to the General Contractor as to sizes and locations of recesses required to install panel boxes and other equipment or devices. If the information is late or incorrect, this Contractor shall, at his own expense, have the trade which originally installed the work do the required cutting and patching.
- B. Perform all cutting of concrete or other material for passage of raceways as required to install the work.
- C. Close all such openings around raceways with material as specified under the heading "SEALING".
- D. Install concealed work in place for the mason to wall-in as he carries up the walls; otherwise, this Contractor will be responsible as stated in the first paragraph.
- 3.7 SEALING
  - A. Fire-Rated Sealing Method:
    - 1. Fire stopping of all thru-penetrations of fire and/or smoke rated assemblies (partitions, floors, ceilings, etc.) shall be the responsibility of each installer or building trade (Mechanical, Plumbing, Electrical, Communications, Data, etc.) making the thru-penetrations, unless otherwise indicated on the Architectural series drawings (A-series). It is the responsibility of the Contractor making the thru-penetrations to verify and coordinate fire stopping with fire rating, assembly type and field conditions.
    - 2. Sleeves, openings and sealants shall comply with applicable codes, recommended practices and standards, and manufacturer's instructions. Fire sealants shall have ability to prevent spread of flame, smoke or water throughout the penetration and shall pass 3 hour test, UL test ASTM E814 and UL 1479.
    - 3. Products: Refer to Division 7 of the specifications for Fire Stopping Requirements.

## 3.8 OFFSETS AND MODIFICATIONS

- A. Furnish and install all offsets necessary to install the work and to provide clearance for the work of other trades.
- B. Maintain adequate clearance as directed by the Architect/Engineer.
- C. Incidental modifications necessary to the installation shall be made as necessary and at the direction and/or approval of the Architect.

#### 3.9 SLEEVES

- A. Furnish and install sleeves for all raceways passing through floors and walls. Sleeves shall be Schedule 40 galvanized steel pipe and shall extend 1" above finished floor surface. Where sleeves are set in interior walls, they shall finish flush with the wall.
- B. Furnish and install watertight sleeves for all raceways extending through foundation walls into crawl spaces, mechanical rooms or basement areas from building exterior or from unexcavated areas to building interior. Sleeve shall consist of extra heavy pipe sleeve with anchor flange. Space between raceway and the sleeve shall be sealed with modular wall and casing seal similar to Thunderline Corporation "Link-Seal",, Metraseal or approved substitute. Install seal in strict accordance with the manufacturer's recommendations.

#### 3.10 ITEMS RECESSED IN MASONRY CONSTRUCTION

- A. Wherever boxes, electric panels, equipment, devices, access panels, and similar items of electrical construction are installed in exposed masonry construction, the Contractor shall utilize and submit for approval items of such size, height, and arrangement to conform to the corresponding masonry unit. The Contractor shall include as part of this contract, the necessary offsets, adjustments and relocations necessary to conform with the instructions of the Architect as to the final location of the equipment item in the exposed masonry.
- B. As part of his contract and before the purchase of the items hereinbefore mentioned, the Contractor shall notify the Architect of such modifications in the building arrangement that will be necessary to accommodate the proposed equipment.

## 3.11 ROOF FLASHINGS

- A. All conduit extending through roofs shall be provided with watertight flashing and counterflashing as hereinafter described.
- B. Furnish and install standard counterflashing fittings on the conduit or properly designed clamped counterflashing with caulking as directed by the Architect/Engineer.

## 3.12 PAINTING

- A. Refinish all factory applied finishes that have been damaged to match the original finish as directed by the Architect.
- B. Prime coat all steel furnished under this Division with material and methods as described in another Section under the heading "PAINTING".
- 3.13 EQUIPMENT CONNECTIONS
  - A. Provide required wiring, raceways and final connections for all equipment provided by this Division and Divisions 1 thru 23.
  - B. Make final connections in accordance with wiring diagrams obtained from equipment manufacturer.

C. Rough-in in accordance with approved shop drawings from the manufacturer or supplier of the equipment. Rough-in prior to shop drawing approval will be subject to change without adjustment to contract cost.

# 3.14 BALANCING

A. The system of feeder and branch circuits for power and lighting shall be connected to panel busses in such a manner as to electrically balance the connected load as close as is practicable. Should the Owner disclose any unfavorable conditions reacting on the service, this Contractor shall make such changes as may be suggested to balance the load.

# 3.15 GUARANTEE

- A. All work shall be guaranteed to be free from defects for a period of one year of operation from date of acceptance by the Owner unless otherwise specified in Division 1.
- B. Guarantee shall be extended on an equal time basis for all non- operational periods due to failure within the guarantee period.

END OF SECTION 260000

# SECTION 260055: ELECTRICAL IDENTIFICATION

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. This section is a Division 26 Basic Materials and Methods Section, and is part of each Division 26 Section making reference to electrical identification specified herein.
- 1.2 DESCRIPTION OF WORK
  - A. Types of electrical identification specified in this section include the following:

Cable conductor identification. Operational instructions and warnings. Danger signs. Equipment/system identification signs.

#### PART 2 – PRODUCTS

- 2.1 MANUFACTURERS
  - A. Subject to compliance with requirements, provide products of one of the following (for each type of marker):

W. H. Brady Co.Ideal Industries, Inc.Seton Name Plate Co.3M Electrical Products

# 2.2 ELECTRICAL IDENTIFICATION MATERIALS

A. Provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is Installer's option, but provide single selection for each application.

## 2.3 COLOR-CODED PLASTIC TAPE

- A. Provide manufacturer's standard vinyl tape not less than 7 mils thick by 3/4" wide.
- B. Colors: Unless otherwise indicated or required by governing regulations, provide tape color as indicated in Paragraph 3.2.B.
- C. Tape shall be of Type 3M Scotch 35 for color coding, Scotch Super 33+ for splices and Tem Flex 1700 for general use.

# 2.4 CABLE/CONDUCTOR IDENTIFICATION BANDS

A. Provide manufacturer's standard vinyl cloth, self-adhesive cable/conductor markers of wrap-around type; either pre-numbered, plastic-coated type, or write-on type with clear plastic, self-adhesive cover flap; numbered to show circuit identification.

# 2.5 BAKED ENAMEL DANGER SIGNS

A. Provide manufacturer's standard "DANGER" signs of baked enamel finish on 20-gage steel; of standard red, black and white graphics; 14" x 10" size except where 10"x 7" is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation wording (as examples: HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH).

# 2.6 ENGRAVED PLASTIC-LAMINATE SIGNS

- A. Provide engraved stock melamine plastic laminate, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
- B. Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8" for larger units.
- C. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

# 2.7 LETTERING AND GRAPHICS

A. Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of electrical systems and equipment.

#### PART 3 – EXECUTION

#### 3.1 APPLICATION AND INSTALLATION

- A. Coordination: Where identification is to be applied to surfaces which require finish, install identification after completion of painting.
- B. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.

# 3.2 CABLE/CONDUCTOR IDENTIFICATION

A. Apply cable/conductor identification on each cable and conductor in each box/enclosure/cabinet where wires of more than one circuit or communication/signal system are present. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project electrical work.

- B. Conductor Color Coding:
  - 1. All conductors used in all systems shall have insulation that is inherently colored. All conductors of a system performing the same function shall be colored alike throughout the project.
  - 2. Equipment Grounding Conductors:
    - a. Standard and/or general feeders or circuits shall be green.
    - b. Isolated feeders or circuits shall be green with yellow stripe.
  - 3. On larger conductors, where colored insulation is not available, colored tape adhesive vinyl bands 3/4" width may be installed 6" maximum from the end of the conductors. Where passing through pull boxes without splice, each conductor shall be banded.
  - 4. Power system conductor colors shall be as follows:
    - a. 120/208 Volt System

Phase A - Black Phase B - Red Phase C - Blue Neutral - White or Gray

b. 277/480 Volt System

Phase A - Brown Phase B - Orange Phase C - Yellow Neutral - White or Gray

# 3.3 DANGER SIGNS

- A. In addition to installation of danger signs required by governing regulations and authorities, install appropriate danger signs at locations indicated and at locations subsequently identified by Installer of electrical work as constituting similar dangers for persons in or about project.
- B. High Voltage: Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power voltages higher than 110-120 volts.

# 3.4 EQUIPMENT/SYSTEM IDENTIFICATION

A. Install engraved, plastic laminate sign on each major unit of electrical equipment in building, including central or master unit of each electrical system including communication/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2" high lettering on 1-1/2" high sign (2" high where 2 lines are required), white lettering in black field. Provide text matching terminology and numbering of the contract documents and shop drawing. Provide signs for each unit of the following categories of electrical work:

- 1. Panelboards, electrical cabinets and enclosures.
- 2. Access panel/doors to electrical facilities.
- B. Install signs at locations for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate the substrate.

# 3.5 JUNCTION AND PULL BOX IDENTIFICATION

- A. Emergency Systems: Each junction and pull box cover shall be painted orange. Use black indelible liquid marker to label "EMERG." in 3/8" letters minimum.
- B. Fire Alarm System: Each junction and pull box cover shall be painted red. Use black indelible liquid marker to label "F.A." in 3/8" letters minimum.
- C. Feeders Shown on Single Line Diagram: Each junction and pull box shall be marked with black indelible liquid marker with the assigned feeder number "FDR #38" in 3/8" letters minimum.

END OF SECTION 260055

## SECTION 260110: RACEWAYS

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
  - B. Refer to Section 260000 for General Provisions Electrical.
- 1.2 DESCRIPTION OF WORK
  - A. Types of raceways in this section include the following:

Rigid metal conduit Intermediate metal conduit Electrical metallic tubing. Flexible metal conduit. Liquid-tight flexible metal conduit.

- 1.3 REFERENCE STANDARDS
  - A. Refer to Section 260000 for a general description of requirements applying to this Section.
- 1.4 QUALITY ASSURANCE
  - A. Refer to Section 260000 for a general description of requirements applying to this Section.
- 1.5 WARRANTY/GUARANTEE
  - A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

## 1.6 COORDINATION

- A. The drawings and details there upon are scheme and/or diagrammatic in nature, and indicate the need and intent of the design. These are to be used for general guidance only. It shall be the responsibility of the Electrical Contractor to coordinate, with other Division Subcontractors, the installation of all raceways, raceway supports, junction boxes and required fittings. This coordination will include conduit layout to allow access to equipment for maintenance.
- B. This coordination shall be carried out prior to actual installation; this shall be done to eliminate the possibility of conflicts between trades on items such as access, clearances and maintenance issues that may arise after completion of construction.

C. Should the coordination not be carried out prior to installation, and a conflict exists, the installing contractor shall remove and reinstall the equipment as required to clear the conflict at no additional cost to the Owner and no delay in project completion.

# PART 2 – PRODUCTS

## 2.1 MATERIALS AND EQUIPMENT

- A. <u>Rigid Metal Conduit</u>:
  - 1. Raceway: Full weight, heavy wall rigid steel with zinc coating conforming to ANSI-C80.1.
  - 2. Fittings: Cast malleable iron fittings with threaded hubs, insulated throat and zinc protective coating.
  - 3. Subject to compliance with requirements, provide products of one of the following:

Allied Tube and Conduit Corporation LTV Steel Tubular Products Co. Wheatland Tube

- B. Intermediate Metal Conduit:
  - 1. Raceway: Light weight, rigid steel, hot dipped galvanized manufactured in accordance with UL1242.
  - 2. Fittings: Cast malleable iron fittings with threaded hubs, insulated throat and zinc protective coating.
  - 3. Subject to compliance with requirements, provide products of one of the following:

Allied Tube and Conduit Corporation LTV Steel Tubular Products Co. Wheatland Tube

- C. <u>Electrical Metallic Tubing</u>:
  - 1. Raceway: Light weight, thin wall, rigid steel, hot dipped galvanized manufactured in accordance with ANSI C80.3.
  - 2. Fittings: Raintight, insulated throat, compression type with zinc protective coating.
  - 3. Subject to compliance with requirements, provide products of one of the following:

Allied Tube and Conduit Corp. LTV Steel Tubular Products Co. Wheatland Tube Co.

## D. Flexible Metal Conduit:

- 1. Raceway: Construct of single strip, flexible, continuous, interlocked, and double-wrapped steel, galvanized inside and outside.
- 2. Fittings: Steel, insulated throat, with zinc protective coating.
- 3. Subject to compliance with requirements, provide products of one of the following:

AFC Alflex Corp. Electri-Flex Company

- E. Liquid-Tight Flexible Metal Conduit:
  - 1. Raceway: Construct of single strip, flexible, continuous, interlocked, and double-wrapped, galvanized inside and outside, coat with liquid-tight jacket of flexible polyvinyl chloride.
  - 2. Fittings: Steel, water and oiltight, insulated throat, with zinc protective coating.
  - 3. Subject to compliance with requirements, provide products of one of the following:

AFC Alflex Corp. Electri-Flex Company

### F. Wireways:

- 1. Furnish electrical wireways of the type, size, and style for each service indicated. Wireway shall be a complete assembly including but not necessarily limited to, couplings, offsets, elbows, adapters, hold-down clips, end-caps and other components and accessories as needed for a complete system.
- 2. System shall fulfill wiring requirements as indicated in contract documents, and shall comply with applicable portions of Article 362 of the National Electrical Code.
- 3. Subject to compliance with requirements, provide products of one of the following:

Circle AW Products Co. The EMF Company, Inc. Hoffman Engineering Company Square "D" Company

G. The above items shall include the statement "Approved Equal" and/or "Approved Substitute". This statement requires that the product or item be in compliance with the written intent of this specification and the submission meets the requirements of Section 260000.

# PART 3 – EXECUTION

## 3.1 INSTALLATION OF ELECTRICAL RACEWAYS

- A. Install electrical raceways in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA "Standard of Installation", and complying with recognized industry practices.
- B. Coordinate with other work as necessary to interface installation of electrical raceways, wireways and required components.
- C. Raceways used for distribution, feeders, or branch circuits shall be a minimum size of 3/4" or equal equivalent cross-sectional area. Raceways used for control and signal shall be a minimum size of 1/2" or equal equivalent cross-sectional area.
- D. All raceways shall be concealed within the building construction, where indicated on the floor plans surface raceway shall be installed. Should it be impossible or impracticable to install a raceway concealed and surface raceway is not indicated, the Contractor shall consult with the Architect or Engineer for approval prior to installation.
- E. All raceways installed in ceiling cavities and exposed within mechanical spaces shall be run parallel with building lines and installed level and square at the proper elevation/height.
- F. Complete the installation of electrical raceways before starting the installation of cables/wires within the raceway.
- G. Furnish and install one (1) nylon or fiberglass pull cord in each empty raceway. Each empty raceway shall be cleaned, capped, and tagged as to its termination location.
- H. Install liquid-tight flexible metal conduit for connections to motors and for other electrical equipment when subject to movement and vibration, and also where subjected to one or more of the following conditions:
  - 1. Exterior locations.
  - 2. Moist or humid atmosphere when condensation can be expected to accumulate.
  - 3. Corrosive atmosphere.
  - 4. Subjected to water spray.
  - 5. Subjected to dripping oil, grease or water.
- I. Install Electrical Metallic Tubing for building interior electrical work except:
  - 1. Underground
  - 2. In gravel, cinder, concrete or other sub-base floor construction.
  - 3. Horizontal runs in concrete floor slabs.
  - 4. Where exposed to the elements.
  - 5. In masonry construction below finished grade.
  - 6. Vertically in poured concrete walls.

- J. Where and whenever possible, install horizontal electrical raceways as tight to building construction as possible and above water, drain and steam piping. A separation of at least six (6) inches shall be maintained between electrical conduits and hot water and steam piping.
- K. In accordance with NEC requirements, install Rigid or Intermediate Metal Conduit where Electrical Metallic Tubing is not permitted.
- 3.2 CLEANING
  - A. Upon completion of installation of raceways, inspect interiors of raceways; remove burrs, dirt and construction debris.

## SECTION 260120: WIRES AND CABLES

#### PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
  - A. This section is a Division 26 Basic Materials and Methods section and is part of each Division 26 Section making reference to wires and cables specified herein.
- 1.2 DESCRIPTION OF WORK
  - A. Electrical wire and electrical cable work is indicated by drawings and specifications.
  - B. Arrange for and coordinate with the Utility Company and pay any and all costs in conjunction with the 25KV primary service from the point of connection to 25KV pad-mounted transformer.
  - C. Types of wire, cable and connectors in this section include, but not limited to the following:

Copper conductors. Tap type connectors. Split-bolt connectors.

- D. Refer to other sections of Division 26 for, but not limited to, raceways, connections used in conjunction with wire and cable work.
- E. Applications for wire, cable and connectors required for project are as follows unless otherwise indicated:
  - 1. Power Distribution Circuitry.
  - 2. Appliance and Equipment Circuitry.
  - 3. Motor Branch Circuitry.
  - 4. Control Circuitry.
  - 5. Signal/Communication Circuitry.

## PART 2 – PRODUCTS

#### 2.1 MANUFACTURERS

A. <u>Wire and Cable</u> Anaconda Wire and Cable Co. Advance Wire and Cable, Inc. American Cerro Wire and Cable Co. Electrical Conductors, Inc. General Cable Corp. Rome Cable Corp. Southwire Company Triangle PWC,, Inc. General Electric Co. <u>Connectors</u> Burndy Corp. Eagle Electric Mfg. Co., Inc. Gould, Inc. Ideal Industries, Inc Joslyn Mfg. and Supply Co. O-Z/Gedney Co. Pyle National Co. Thomas and Betts Co.

# 2.2 WIRE, CABLE AND CONNECTIONS

- A. Except as otherwise indicated, provide wire, cable and connectors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, and as required for the installation. Minimum wire and cable size is #12 AWG for power and branch circuits and #14 AWG for control and signal/communication circuits unless otherwise indicated.
- B. Wire: Provide factory fabricated wire of sizes, ratings, materials and types indicated for each service. Where not indicated, provide proper selection as determined by Installer to comply with project's installation requirements and NEC standards. Select from the following types, materials, conductor configurations, insulation and coverings:
  - UL Type: THHN UL Type: TW UL Type: THW UL Type: THWN UL Type: TF UL Type: XHHW UL Type: AC (Armor Clad) UL Type: MC (Metal Clad)

Material: Copper

Conductors: Solid (AWG 14 to AWG 10 only). Conductors: Concentric-lay-stranded (standard flexibility)

Outer Covering: Nylon Outer Covering: Thermoplastic

C. Connectors: Provide factory fabricated metal connectors of sizes, ratings, materials, types and classes as required for each service. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and NEC standards. Select from the following types, classes, kinds and styles.

Type: Pressure Type: Crimp Type: Threaded Class: Insulated Class: Non-insulated

Kind: Copper (for CU to Cu connection).

Style: Butt connection

Style: Elbow connection

Style: Combined "T" and straight connection

Style: "T" connection.

Style: Split-bolt parallel connection

Style: Tap connection

Style: Pigtail connection

### PART 3 – EXECUTION

# 3.1 INSTALLATION

- A. Install electrical cables, wires and connectors, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface. Pull conductors together where more than one is being installed in a raceway. Use pulling compound or lubricate, where necessary; compound must not deteriorate conductor or insulation. Use pulling means including fish tape, cable or rope which cannot damage raceway. Rope must be used as pulling means when pulling wires or cables into plastic conduit and duct. Keep conductor splices to a minimum and install in junction boxes only. No splices shall be permitted within conduit. Install splices and tapes which have mechanical strength and insulation rating equivalent or better than conductor. Use splice and tape connectors which are compatible with conductor material.

### 3.2 FIELD QUALITY CONTROL

- A. Prior to energization, test cable and wire for continuity of circuitry and also for short circuits. Correct malfunctions when detected.
- B. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements.

## SECTION 260121: WIRE CONNECTIONS AND DEVICES

#### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

A. This section is a Division 26 Basic Materials and Methods Section and is part of each Division 26 Section making reference to connectors and termination devices specified herein.

#### 1.2 DESCRIPTION OF WORK

- A. Extent of electrical connectors and termination work is indicated by drawings and specifications.
- B. Types of connectors and termination devices in this section include, but are not limited to the following:
  - 1. Tap type connectors.
  - 2. Split-bolt connectors.
- C. Refer to other sections of Division 26 for, but not limited to, raceways, wires and cables used in conjunction with connectors and termination devices.
- D. Applications for connectors and termination devices required for project are as follows unless otherwise indicated:
  - 1. Branch circuitry
  - 2. Equipment circuitry
  - 3. Control circuitry

#### 1.3 SUBMITTALS

A. Product Data: Submit manufacturer's data on electrical connectors, high voltage termination to the Engineer.

## PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide connectors, high voltage terminations of one of the following manufacturers for each item used: Burndy Corp.
Eagle Electric Mfg. Co., Inc.
Gould, Inc.
Ideal Industries, Inc.
Joslyn Mfg. and Supply Co.
O-Z/Gedney Co.
Pyle National Co.
Thomas and Betts Co.
Cooper Power Systems

## 2.2 CONNECTORS

A. Provide factory fabricated metal connectors of sizes, ratings, materials, types and classes as indicated for each service. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and NEC standards.

Type: Pressure Crimp Threaded

Class: Insulated Non-Insulated

Kind: Copper (for CU to Cu connection).

Style: Butt Connection Elbow connection Combined "T" and straight connection "T" connection Split-bolt parallel connection Tap connection Pigtail connection

### PART 3 – EXECUTION

# 3.1 600 VOLT CABLE CONNECTOR INSTALLATION

- A. Install electrical connectors, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Coordinate cable, wire and connector installation work with electrical raceway and equipment installation work, as necessary for proper interface. Pull conductors together where more than one is being installed in a raceway. Use pulling compound or lubricate, where necessary, compound must not deteriorate conductor of insulation, and must be in accordance with wire and cable manufacturer's recommendations. Use pulling means including fish tape, cable or rope which shall not damage raceways including plastic conduits and ducts.

# 3.2 HIGH VOLTAGE TERMINATION INSTALLATION

- A. Install high voltage terminations in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Coordinate terminations with cable, raceway and equipment installation work, as necessary for proper interface. Contractor shall coordinate termination kits with the size, type and style of high voltage cable being installed, in accordance with cable and termination manufacturer's written instructions and recommendations.

# WIRE CONNECTIONS AND DEVICES

# 3.3 FIELD QUALITY CONTROL

- A. Prior to energization, test cable and wire for continuity of circuitry and also for short circuits. Correct malfunctions when detected.
- B. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements.

# SECTION 260135: ELECTRICAL BOXES & FITTINGS

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

A. This section is a Division 26 Basic Materials and Methods section, and is a part of each Division 26 section making reference to electrical wiring boxes and fittings specified herein.

#### 1.2 DESCRIPTION OF WORK

A. Types of electrical boxes and fittings in this section include the following:

Outlet boxes. Junction boxes. Pull boxes. Conduit bodies. Bushings. Locknuts. Knockout closures.

## PART 2 – PRODUCTS

### 2.1 INTERIOR METALLIC OUTLET BOXES

- A. Provide galvanized flat rolled sheet steel interior outlet non-gangable wiring boxes, of types, shapes and sizes, including box depths, to suit each respective location and installation; construct with stamped knockouts in back and sides and with threaded screw holes with corrosion-resistant screws for securing box covers and wiring devices.
- B. Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used and fulfilling requirements of individual wiring situations. Choice of accessories is Installer's option.
- C. Manufacturer: Subject to compliance with requirements, provide interior outlet boxes of one of the following:

Appleton Electric Co. Bell Electric/Square D Co. Pass and Seymour, Inc. RACO, Inc. Steel City/Midland-Ross Corp.

# 2.2 WEATHERPROOF OUTLET BOXES

A. Provide corrosion resistant cast-metal weatherproof outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit ends, cast-metal face plates with spring-hinged waterproof caps suitably configured for each application, including face plate gaskets and corrosion-resistant fasteners.

# **ELECTRICAL BOXES & FITTINGS**

B. Manufacturer: Subject to compliance with requirements, provide weatherproof outlet boxes of one of the following:

Arrow-Hart Div., Crouse-Hinds Co. Bell Electric/Square D Co. Harvey Hubbell, Inc. O-Z/Gedney Co. Slater Electric Co.

# 2.3 JUNCTION PULL BOXES

- A. Provide galvanized code-gauge sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.
- B. Manufacturers: Subject to compliance with requirements, provide junction and pull boxes of one of the following:

Adalet-PLM Div., Scott and Fetzer Co. Appleton Electric Co. Arrow-Hart Div., Crouse-Hinds Co. Bell Electric/Square D Co. GTE Corporation Keystone Columbia, Inc. O-Z/Gedney Co. Slater Electric Co. Spring City Elect. Mfg. Co.

# 2.4 CONDUIT BODIES

- A. Provide galvanized cast-metal conduit bodies, of types, shapes, and sizes, to suit respective locations and installation, construct with threaded-conduit-entrance ends, removable covers, and corrosion-resistant screws.
- B. Manufacturers: Subject to compliance with requirements, provide conduit bodies of one of the following:

Appleton Electric Co. Crouse-Hinds Co. Gould, Inc. Killark Electric Mfg. Co. O-Z/Gedney Co. Spring City Electrical Mfg. Co.

### 2.5 BUSHINGS, KNOCKOUT CLOSURES AND LOCKNUTS

A. Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and insulated malleable iron conduit bushings, offset connectors, of types and sizes to suit respective uses and installation.

# **ELECTRICAL BOXES & FITTINGS**

B. Manufacturers: Subject to compliance with requirements, provide bushings, knockout closures, locknuts and connectors of one of the following:

Appleton Electric Co. Burndy Corp. Crouse-Hinds Co. Gould, Inc. O-Z/Gedney Co. RACO, Inc. Steel City/Midland-Ross Corp. Thomas and Betts Co., Inc.

### PART 3 – EXECUTION

# 3.1 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

- A. Install electrical boxes and fittings, complying with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.
- B. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.
- C. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture.
- D. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- E. Install boxes and conduit bodies in those locations to ensure ready accessibility of electrical wiring.
- F. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surface.
- G. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.
- H. Provide electrical connections for installed boxes.
- I. Pull boxes and junction boxes shall be furnished and installed in all conduit runs at intervals not exceeding 100 feet maximum.
- J. Identify each circuit in all pull boxes and junction boxes whether the box contains one or more circuits.

## SECTION 260140: WIRING DEVICES

### PART 1 – GENERAL

- 1.1 DESCRIPTION OF WORK
  - A. The extent of wiring device work is indicated by drawings, schedules and specifications. Wiring devices are defined as single discrete units of the electrical distribution system which are intended to carry but not utilize electric energy.
  - B. Types of electrical wiring devices in this section include the following:

Receptacles. Switches. Device plates. Lamp dimmers Fire-Rated Poke-Thru Floor Outlet Energy Control Devices

#### 1.2 SUBMITTALS

A. Product Data: Submit manufacturer's data on electrical wiring devices.

#### PART 2 – PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS
  - A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of wiring device):

Legrand Co. Hubbell, Inc. Leviton Mfg. Co. Lutron Electronics Co., Inc. Cooper Wiring Devices

## 2.2 FABRICATED WIRING DEVICES

A. Provide factory fabricated wiring devices, in types, styles, colors, and electrical ratings for applications indicated and complying with NEMA Standards Pub. No. WD 1. Where types and grades are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements, and complying with NEC and NEMA Standards for wiring devices. Provide brown color devices and wall plates except as otherwise selected; color selection to be verified by Contractor with Architect/Engineer.

### 2.3 RECEPTACLES

- A. Heavy-Duty Simplex: Provide single-duty type receptacles, 2 pole, 3 wire grounding, with green hexagonal equipment ground screw, 20 amperes, 125 volts with metal plaster ears, side wiring, NEMA configuration 5-20R unless otherwise indicated.
- B. Heavy-Duty Duplex Standard Style: Provide extra heavy-duty industrial series duplex receptacles, 2 pole, 3 wire grounding type with green hexagonal equipment ground screw, 20 amperes, 125 volts with metal plaster ears, side wiring, NEMA configuration 5-20R unless otherwise indicated. Similar to Hubbell Series HBL Series, or approved substitute.
- C. Special Purpose Receptacles: Provide polarized grounding type special purpose receptacles of the required amperage and voltage ratings for the duty intended. Device shall include a green hexagonal equipment ground screw.
- D. Ground Fault Receptacle: Provide hospital grade heavy duty duplex receptacle, 2 pole, 3 wire grounding type with green hexagonal equipment, ground screw and integral ground fault circuit interrupter, UL rated Class A, Group 1, 20 amperes, 125 volts, 60 Hertz with metal plaster ears, side wiring, NEMA Configuration 5-20R. Device shall include solid state ground-fault sensing and signalling, with a 5 milliampere ground fault trip level, plus or minus 1 milliampere. Similar to Hubbell Cat. No. GFR8300H Series, or approved substitute.
  - 1. Whether indicated or not on the floor plans, the Electrical Contractor shall furnish and install GFI protected devices in commercial kitchen areas next to lavs, on rooftop equipment, on exterior walls; and as indicated by the N.E.C., it shall be the discretion of the Electrical Contractor to provide GFI receptacles or GFI circuit breaker.

### 2.4 SWITCHES

A. Toggle Switch: Provide extra heavy duty, industrial series flush toggle, 1 pole, 2 pole, 3-way, 4-way AC quiet switch rated 20 amperes @ 120/277 volts with green hexagonal equipment ground screw, metal plaster earls, and side wired screw terminals. Similar to Hubbell Series HBL Series or approved substitute.

### 2.5 DEVICE PLATES

- A. Provide switch and receptacle outlet wall plates for wiring devices, of types, sizes, and with ganging and cut outs required by the devices being installed. Construct with metal screws for securing plates to devices; screw heads colored to match finish of plates; plates colored to match wiring devices to which attached. Provide device plates possessing the following additional construction features: **Receptacle outlet plates to be permanently marked with panel designation and circuit number on back side of plate.** 
  - 1. Metal Plates to be stainless steel of non-corrosive and non-magnetic 302 alloy, .032" nominal thickness. Plates shall have brushed satin finish.
- B. Weatherproof device plates shall have spring-hinged waterproof cap suitably configured for each application, including face plate gaskets and corrosion-resistant fasteners. Provide device plates possessing the following construction materials and finishes:

- 1. Cast Aluminum Plates shall be die-cast, copper-free aluminum construction with a baked-on lacquer finish.
- C. Existing mechanical spaces where concealed work is impractical, such as masonry pr block walls, Provide 4" square boxes, surface mounted, with ½" deep surface mounted device plates consisting of same material for devices indicated on plans, whether single or double gang. Use of plaster flange and standard cover plate will not be acceptable.

# 2.6 LAMP DIMMERS

A. Fluorescent: Provide solid state AC wall dimmer with integrated linear slide control and separate rocker for ON/OFF switching at present lighting level. Device shall have a built-in RF interference filter and be rated to control from 2 to 12 40 watt rapid-start lamps up to 4800 watts maximum @ 120/277 volts, 60 hertz. Dimmer control and fixture ballast shall be compatible in accordance with equipment manufacturer's requirements. Dimmer control shall be similar to Leviton or approved equal.

# 2.7 FIRE-RATED POKE-THRU FLOOR OUTLET

- A. Floor outlet shall be designed for a fire rating of a minimum of three (3) hours in floors employing steel units with concrete topping.
- B. Floor thickness range shall be from 2-1/4" to 7" with a UL spacing of a minimum of two (2) feet on center and not more than one (1) unit per each 65 square feet of floor area.
- C. Floor outlet shall be designed to fit a 4" diameter cored hole.
- D. Floor outlet shall be equipped with four (4) NEMA 5 20R, 20 AMP, 125 volt receptacles and four (4) data/telephone outlets as indicated in contract documents.
- E. Floor outlet shall be similar to Hubbell Cat. No. PT4X4BRS or approved substitute.
- 2.8 ENERGY CONTROL DEVICES (Occupancy Sensors)
  - A. Line Voltage:
    - 1. Combination wall switch and sensor shall be Dual Technology Passive Infrared and Ultrasonic with a coverage of 180° for 20 feet. Device shall be suitable for 120/277 dual voltage operation. Device shall be similar to Sensor Switch Cat. No. WSD-PDT or approved substitute.
    - 2. Ceiling sensor shall be Dual Technology Passive Infrared and Ultrasonic 360° coverage. Self Contained Relay Device shall be suitable for 120/277 Dual Voltage operation. Device shall be similar to Sensor Switch Cat. No. CMR-PDT or approved substitute.
  - B. Low Voltage:
    - 1. Ceiling mounted sensor shall be Dual Technology Passive Infrared and Ultrasonic with 360° coverage up to 20 feet. Device accepts 12 to 24 volt AC or DC. Device shall be similar to Sensor Switch Cat. No. CM-PDT or approved substitute.

2. Sensor power pack shall be a low voltage power supply with an input of either 120 volts or 277 volts AC and an output of 24 volts DC @ 150 mA. Device shall contain a 20 AMP isolated load control relay. When relay is used, power supply output shall be reduced to 24 volts DC @ 114 mA. Device shall be similar to Sensor Switch PP-20 or approved substitute.

# PART 3 – EXECUTION

# 3.1 INSTALLATION OF WIRING AND CONTROL DEVICES

- A. Install wiring devices as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate with other work, including painting, electrical box and wiring work, as necessary to interface installation of wiring devices with other work.
- C. Install wiring devices only in electrical boxes which are clean, free from building materials, dirt and debris.
- D. Provide electrical connections for wiring and control devices.
- E. Delay installation of all wiring and control devices until wiring work is completed.
- F. Isolated Ground Receptacle Devices shall be connected to the system ground by way of an insulated ground conductor color coded green with a yellow stripe.
- 3.2 PROTECTION OF WALL PLATES AND RECEPTACLES
  - A. At time of Substantial Completion, replace those items which have been damaged, including those burned and scorched by faulty plugs.

### 3.3 GROUNDING

- A. Provide electrically continuous, tight grounding connections for wiring and control devices.
- 3.4 TESTING
  - A. Prior to energizing circuitry, test wiring devices for electrical continuity and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate compliance with requirements.
  - B. After energizing circuitry, the Electrical Contractor shall test and adjust all control devices to provide optimum operation and performance.

## SECTION 260155: MOTOR STARTERS

### PART 1 – GENERAL

- 1.1 DESCRIPTION OF WORK
- A. Extent of motor starter work is indicated by drawings, schedules and specifications.
- B. Refer to sections of other divisions of these specifications for driven equipment specified without motor starters. Motor starters for such equipment are the work of this section.
- C. Types of motor starters in this section include the following:

Manual. Magnetic Full Voltage, Non-Reversing. Combination Disconnect Switch and Magnetic Starter.

# 1.2 SUBMITTALS

A. Product Data: Submit manufacturer's data on motor starters and accessories.

# 1.3 COORDINATION

- A. The drawings and details there upon are scheme and/or diagrammatic in nature, and indicate the need and intent of the design. These are to be used for general guidance only. It shall be the responsibility of the Electrical Contractor to coordinate with other Division subcontractors, the installation of all motor starters, the need for control devices including the wiring and conduit, to and from the device.
- B. This coordination shall be carried out prior to actual installation. This shall be done to eliminate the possibility of conflicts between trades on items such as access, clearances and maintenance issues that may arise after completion of coordination.
- C. During the coordination phase of the project, the Electrical Contractor shall consult with Division 1 thru 23 subcontractors with regard to base design equipment characteristics. Any differences from the electrical plans and specifications shall be considered a change. The trade's contractor making the change at no additional cost to the Owner or delay in project completion shall handle these additional costs.

### PART 2 – PRODUCTS

# 2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type and rating of motor starter):

Allen-Bradley Co. Cutler Hammer Products Furnas Electric Co. General Electric Co. Square D Co. Siemens

# 2.2 MOTOR STARTERS

- A. Provide motor starters and ancillary components; of types, sizes, ratings and electrical characteristics indicated which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installations.
- B. Fractional HP Manual Motor Starters: Provide manual, single phase, fractional HP motor starters for each motor rated less than 1/2 HP, of types, ratings and electrical characteristics indicated. Equip unit with thermal overload relay for protection of 120 volt AC motors. Provide starters with quick-make, quick-break, trip free toggle mechanisms, selector switches for hand-off-automatic control; mount starter in NEMA Type 1 or Type 4 enclosure as indicated or required by the NEC.
- C. Magnetic Motor Starter: Provide magnetic full voltage, non-reversing starters for each motor rated 1/2 HP and more of types, ratings and electrical characteristics indicated; equip with solid state overload relays, control transformers with 120V secondary, with one secondary fuse and one grounded secondary lead, two normally open and two normally closed auxiliary contacts, hand-off- automatic selector switch, red and green pilot lights wired and mounted through front of the enclosure. Mount starter in NEMA Type 1 or Type 4 enclosure as required by the NEC.
- D. Combination Disconnect Switch Magnetic Starter: Provide full-voltage, non-reversing, combination non-fused disconnect switch and magnetic starter for each motor rated 1/2 horsepower and more, of types, ratings and electrical characteristics indicated; equip with solid state overload relays, control transformer with 120 volt secondary, one secondary fuse and one grounded secondary lead, two normally open and two normally closed auxiliary contacts, hand-off- automatic switch, red and green pilot lights wired and mounted through the front of the enclosure. Mount starter in NEMA Type 1 or Type 4 enclosure as required by the National Electrical Code (NEC).
- E. Three (3) phase, full voltage, non-reversing magnetic motor starters, horsepower rating with minimum NEMA size #0 shall be as follows:

| NEMA<br>Size | Continuous<br>Rating | Maximum Horsepower |         |
|--------------|----------------------|--------------------|---------|
|              |                      | 208 Volt 4         | 80 Volt |
| 0            | 18 AMPs              | 3HP                | 5HP     |
| 1            | 27 AMPs              | 7-1/2HP            | 10HP    |
| 2            | 45 AMPs              | 10HP               | 25HP    |
| 3            | 90 AMPs              | 25HP               | 50HP    |
| 4            | 135 AMPs             | 40HP               | 100HP   |
| 5            | 270 AMPs             | 75HP               | 200HP   |

Motor full-load current shall not exceed continuous ampere rating of starter.

# PART 3 – EXECUTION

# 3.1 INSTALLATION OF MOTOR STARTERS

- A. Install motor starters in accordance with manufacture's written instructions, applicable requirements of NEC, NEMA Standards, and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.
- B. The Electrical Contractor shall consult and cooperate with the Control Contractor in assisting him in making control connections to the automatic position of the selector switch and to the auxiliary contacts.
- C. Motor Data: Before installing wiring for motors and starters, the Electrical Contractor shall consult the respective parties furnishing the equipment and obtain from them all data necessary to properly connect the apparatus, and for selection of thermal overload relays in accordance with motor nameplate. Any variance in loads or electrical characteristics from the contract drawings should be reported to the Engineer before proceeding with the work.
- D. When packaged equipment is furnished, all unit starters shall be furnished, mounted and wired by the installing contractor. The Electrical Contractor shall furnish and install a disconnect switch, as specified in Section 260170, and wire between unit's main terminal block and the disconnect switch.
- E. When packaged rooftop equipment is furnished, the unit disconnect switch and all starters shall be furnished, mounted and wired by the installing contractor. The Electrical Contractor shall wire between the line side of the disconnect switch and the building system.
- F. Provide connections for motor starters.
- 3.2 ADJUST AND CLEAN
  - A. Inspect operating mechanisms for malfunctioning and where necessary adjust units for free mechanical movement.
  - B. Touch-up scratched or marred surfaces to match original finish.
- 3.3 FIELD QUALITY CONTROL
  - A. Subsequent to wire/cable hookup, energize motor starters and demonstrate functioning of equipment in accordance with requirements.

## SECTION 260160: PANELBOARDS

## PART 1 – GENERAL

- 1.1 DESCRIPTION OF WORK
  - A. Extent of panelboard load-center and enclosure work, including cabinets and cutout boxes, is indicated by drawings and schedules.
  - B. Types of panelboards and enclosures in this section include the following:

Appliance Panelboards.

### 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's data including specifications, installation instructions and general recommendations, for each type of panelboard required. Include data substantiating that units comply with requirements.
- B. Shop Drawings: Submit dimensioned drawings of panelboards and enclosures showing layouts of enclosures and required individual panelboard devices, including by not necessarily limited to, circuit breakers, contactors, and accessories, including wiring diagrams of contactors.

# 1.3 COORDINATION

- A. The drawings are scheme and/or diagrammatic in nature, and indicate the need and intent of the design. These are to be used for general guidance only. It shall be the responsibility of the Electrical Contractor to coordinate, with other Division Subcontractors, the installation of all raceways, raceway supports, junction boxes and required fittings. This coordination will include conduit layout to allow access to equipment for maintenance.
- B. This coordination shall be carried out prior to actual installation; this shall be done to eliminate the possibility of conflicts between trades on items such as access, clearances and maintenance issues that may arise after completion of construction.
- C. Should the coordination not be carried out prior to installation, and a conflict exists, the installing contractor shall remove and reinstall the equipment as required to clear the conflict at no additional cost to the Owner and no delay in project completion.

### PART 2 – PRODUCTS

# 2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of panelboard and enclosure):

Square D Company

#### 2.2 PANELBOARDS

- A. General:
  - 1. Panelboards shall comply with the following industry standards:
    - a. UL Listing/Approval
    - b. UL Standards: Panelboards - UL67 Cabinet & Boxes - UL50
    - c. National Electric Code
    - d. NEMA Standard -PBI
  - 2. Interiors:
    - a. All interiors shall be completely factory assembled. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machining, drilling and tapping.
    - b. Branch circuits shall be arranged using double row construction. A nameplate shall be provided listing panel type and rating.
    - c. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection. A ground bus will be included in all panelboards.
  - 3. Boxes: Boxes shall be a minimum 20 inches wide and manufactured from galvanized steel. Provide minimum gutter space in accordance with the National Electric Code.
  - 4. Trim:
    - a. Switching device handles shall be accessible. Panel access doors shall not uncover any live parts. Doors shall have flush type cylinder lock and catch except doors over 48" in height shall have auxiliary fastenings top and bottom of door in addition to the flush type cylinder lock and catch. Panelboard trim clamps shall be of the indicating type. Upon removal of screws behind door, the panel interiors become service accessible via piano hinged trim front.
    - b. Panel access door hinges shall be concealed. All locks shall be keyed alike; directory frame shall be welded metal and having a transparent cover shall be furnished with each door.
    - c. All exterior and interior steel surfaces of the trim shall be properly cleaned, primed with a rust inhibiting phosphatized coating and finish with a gray ANSI 61 paint. Trims for flush panels shall overlap the box for a least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver and without the need for special tools.

- 5. Main Bus and Branch Circuits: All main bus bars shall be full size aluminum, sized in accordance with U.L. standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above an ambient of 40 degrees C maximum.
- B. Appliance Panelboards:
  - 1. Provide switching and protective devices in quantities, ratings, types indicated, with anti-turn solderless pressure type lug connectors approved for copper conductors. Circuit breakers shall be the bolt-on, molded case, thermal magnetic type, with toggle handles that indicate when tripped. Where multiple pole circuit breakers are indicated, provide with common trip so overload on one pole will trip all poles simultaneously.
  - 2. Panelboards for use at 240 volts AC maximum shall incorporate circuit breakers as shown rated at 10,000 A.I.C. symmetrical at 240 volts.

# PART 3 – EXECUTION

# 3.1 INSTALLATION OF PANELBOARDS

- A. Install panelboards and enclosures where indicated in contract documents and, in accordance with the equipment manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.
- B. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secure.
- C. Provide all required electrical and grounding connections within the panelboards and enclosures.
- D. The Electrical Contractor shall furnish and install on the door within each enclosure, a circuit labeling identification system for all electrical panelboards. The system must satisfy the NEC Article No. 110-22. The directories shall be typed, <u>NOT</u> handwritten.

# SECTION 260170: MOTOR AND CIRCUIT DISCONNECTS

#### PART 1 – GENERAL

### 1.1 DESCRIPTION OF WORK

- A. Extent of motor and circuit disconnect switch work is indicated by drawings and schedules.
- B. Types of motor and circuit disconnect switches in this section include the following:

Equipment disconnects. Appliance disconnects. Motor-circuit disconnects.

# 1.2 SUBMITTALS

A. Product Data: Submit manufacturer's data including specifications, installation instructions and general recommendations, for each type of motor and circuit disconnect switch required.

### 1.3 COORDINATION

- A. The drawings are scheme and/or diagrammatic in nature, and indicate the need and intent of the design. These are to be used for general guidance only. It shall be the responsibility of the Electrical Contractor to coordinate, with other Division Subcontractors, the installation of all motor and circuit disconnect switches, supporting hardware, including wiring and conduit, to and from the equipment. This coordination will include conduit layout to allow access to equipment for maintenance.
- B. This coordination shall be carried out prior to actual installation; this shall be done to eliminate the possibility of conflicts between trades on items such as access, clearances and maintenance issues that may arise after completion of construction.
- C. Should the coordination not be carried out prior to installation, and a conflict exists, the installing contractor shall remove and reinstall the equipment as required to clear the conflict at no additional cost to the Owner and no delay in project completion.

## PART 2 – PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type of switch):

Square D Company

# 2.2 FABRICATED SWITCHES

A. Safety Switches: Safety switches shall be of sizes noted on the drawings, fusible or non-fusible and contained in a general purpose enclosure. All switches shall be type HD and have

# MOTOR AND CIRCUIT DISCONNECTS

quick-make, quick- break operation. All switches shall be of proper horsepower rating as applicable and have dual interlocks designed to interlock the switch box door with the switch operating mechanism. Unit shall be provided with a suitable means of interlock release. An arrangement shall be provided for locking the operating handle in the "ON" or "OFF" position. Safety switches shall have the proper type metal enclosure, i.e., standard, weatherproof, etc., to suit their specific location as required by the National Electrical Code.

- B. Fuses: Provide fuses for safety switches, as recommended by switch manufacturer, of classes, types and ratings needed to fulfill electrical requirements for service indicated.
- C. When packaged rooftop equipment is furnished, the unit disconnect switch shall be furnished, mounted and wired by the installing contractor.
- D. When rooftop exhaust fans rated less than 1/2 HP at 120 volts, single phase, are furnished, except utility sets, the unit disconnect switch shall be furnished, mounted and wired by the installing contractor.

PART 3 – EXECUTION

# 3.1 INSTALLATION OF MOTOR AND CIRCUIT DISCONNECT SWITCHES

- A. Install motor and circuit disconnect switches where indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products fulfill requirements.
- B. Install disconnect switches used with motor-driven appliances, and motors and controllers within sight of controller position unless otherwise indicated.
- C. Provide electrical connections for motor and circuit disconnect switches.

## SECTION 260180: OVERCURRENT PROTECTIVE DEVICES

## PART 1 – GENERAL

- 1.1 DESCRIPTION OF WORK
  - A. Extent of overcurrent protective device work is indicated by drawing schedules and specifications.
  - B. Types of overcurrent protective devices in this section include the following:
    - 1. Molded case circuit breaker.

# 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's data on overcurrent protective devices, including: voltages and current ratings, interrupting ratings, current limitations, internal inductive and non-inductive loads, time-current trip characteristic curves, and mounting requirements.
- B. Shop Drawings: Submit layout drawings of overcurrent protective devices, showing spatial relationships of units to associated electrical equipment, and connections to electrical power supplies.

## PART 2 – PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
  - 1. <u>Circuit-Breakers</u> Square D Co.

### 2.2 CIRCUIT BREAKERS

- A. Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, as required for a complete installation.
- B. Molded-Case Circuit Breakers: Provide factory assembled, molded-cased circuit breakers of frame size indicated; 120/208 volts 60 Hertz, one, two, or three poles with a short circuit symmetrical ampere interrupting rating as indicated by the panel schedule and/or as shown by the single line riser diagram. Provide circuit breakers with permanent thermal instantaneous magnetic trips in each pole with ampere ratings as indicated. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make, quick- break action and positive handle trip indication. Construct devices for mounting and operating in any physical position and operating in an ambient temperature of 40 degrees C. Provide circuit breakers with mechanical screw type connector lugs, AL/CU rated.

# **OVERCURRENT PROTECTIVE DEVICES**

# PART 3 – EXECUTION

### 3.1 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

- A. Install overcurrent protective devices as indicated in contract documents, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC Standards for Installation of overcurrent protective devices.
- B. Coordinate with other work, including electrical wiring work, as necessary to interface installation of overcurrent protective devices with other work.
- C. Fasten circuit breakers without causing mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cabling.
- 3.2 ADJUST AND CLEAN
  - A. Inspect circuit-breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.
- 3.3 FIELD QUALITY CONTROL
  - A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

### SECTION 260190: SUPPORTING DEVICES

#### PART 1 – GENERAL

### 1.1 DESCRIPTION OF WORK

A. Types of supports, anchors, sleeves and seals specified in this section include the following: Hangers.
Riser Clamps.
C-clamps
I-beam clamps.
One-hole conduit straps.
Two-hole conduit straps.
Round steel rods.
Lead expansion anchors.
Toggle bolts.
U-Channel Strut Systems.

#### PART 2 – PRODUCTS

#### 2.1 MANUFACTURED SUPPORTING DEVICES

- A. Provide supporting devices, complying with manufacturer's standard materials, design and construct in accordance with published product information, and as required for a complete installation, and as herein specified.
- B. Supports: Provide supporting devices of types, sizes and materials having the following construction features:

Hangers: For supporting EMT conduit, electro-galvanized steel, with 1/4" minimum diameter hole for round steel rod; approximately MSS types 5, 7, 9 or spring steel conduit clips.

Reducing Couplings: Steel rod reducing coupling, 1/4" minimum black steel.

C-Clamps: Black malleable iron, 1/4" minimum rod size.

I-Beam Clamps: Black steel, 1-1/4" x 3/16" stock; 3/8" cross bolt; flange width 2"; approx. 52 pounds per 100 units.

One-Hole Conduit Straps: For supporting EMT conduit, electro- galvanized steel.

Two-Hole Conduit Straps: For supporting EMT conduit, electro-galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes.

Hexagon Nuts: For 1/4" rod size; galvanized steel.

Round Steel Rod: Black steel; 1/4" min. dia.

Offset Conduit Clamps: For supporting rigid metal conduit; black steel.

C. Anchors: Provide anchors of types, sizes and materials indicated; and having the following construction features:

Lead Expansion Anchors: 1/4" - 20 Minimum.

Toggle Bolts: Springhead; 3/16 x 4".

D. Manufacturer: Subject to compliance with requirements, provide anchors of the following:

Ackerman Johnson Fastening Systems, Inc. Elcen Metal Products Co. Ideal Industries, Inc. Rawlplug Co., Inc. Star Expansion Co. U.S. Expansion Bolt Co. Erico Products, Inc. (Caddy) Hilti, Inc.

E. U-Channel Strut Systems: Provide U-channel strut system for supporting electrical equipment, 16-gauge hot dip galvanized steel, construct with 9/16" dia. holes, 8" o.c. on top surface, with standard hot dip galvanized finish, and with the following fittings which mate and match with U-channel.

Beam clamps. Thinwall conduit clamps. Conduit hangers. U-bolts.

F. Manufacturers: Subject to compliance with requirements, provide channel systems of one of the following:

B-Line Systems, Inc. Elcen Metal Products Co. Power-Strut Div.; Van Huffel Tube Corp. Unistrut Div.; GTE Products Corp. Hilti, Inc.

# PART 3 – EXECUTION

# 3.1 INSTALLATION OF SUPPORTING DEVICES

- A. Install hangers and anchors in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA, NEC and ANSI/NEMA for installation of supporting devices.
- B. Install hangers, supports, clamps and attachments to support piping properly from building structure. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible. Install supports with maximum spacings.

## SECTION 260452: GROUNDING

## PART 1 – GENERAL

- 1.1 DESCRIPTION OF WORK
  - A. Types of grounding in this section include the following:

Grounding:

Enclosures. Systems. Equipment.

PART 2 – PRODUCTS

### 2.1 GROUNDING

- A. Except as otherwise indicated, provide each electrical grounding system indicated, with assembly of materials including, but not necessarily limited to, cables/wires, connectors, terminals (solderless lugs), and other items and accessories needed for complete installation. Where materials or components are not otherwise indicated, comply with NEC, NEMA, and established industry standards for applications indicated.
- B. Provide conduit, tube, duct, cable and fittings complying with Division 26 Basic Materials and Methods section, "Raceways", in accordance with the following listing:

Rigid steel conduit. Electrical metallic tubing. Flexible metal conduit. Liquid-tight flexible metal conduit. Rigid metal conduit fittings. EMT fittings. Flexible metal conduit fittings. Liquid-tight flexible metal conduit fittings. Manufactured Cabling Systems

# 2.2 ELECTRICAL GROUNDING CONDUCTORS

A. Unless otherwise indicated, furnish a green insulated equipment grounding conductor for all feeders and branch circuits, matching power supply wiring materials and sized according to NEC.

### 2.3 BONDING PLATES, CONNECTIONS, TERMINALS & CLAMPS

A. Provide electrical bonding plates, connectors, terminals and clamps as recommended by bonding plate, connector, terminal and clamp manufacturers for applications.

## 2.4 GROUND RODS & PLATES

A. Ground Rods: Steel with copper welded exterior, 3/4" dia. x 10'.

## PART 3 – EXECUTION

## 3.1 INSTALLATION OF GROUNDING SYSTEMS

- A. Install electrical grounding systems in accordance with manufacturer's written instructions and with recognized industry practices to ensure grounding complies with requirements. Comply with requirements of NEC, NESC, NEMA and UL standards for installation of grounding systems.
- B. Coordinate with other electrical work as necessary to interface installation of grounding system with other work.
- C. Clamp cable connections to ground rods.
- D. Install bonding jumpers with ground clamps on water meter piping to electrically bypass water meter.
- E. Install clamp-on connectors only on thoroughly cleaned metal contact surfaces, to ensure electrical conductivity and circuit integrity.

# 3.2 FIELD QUALITY CONTROL

A. Upon completion of installation of electrical grounding system, test ground resistance with ground resistance tester. Where tests show resistance-to-ground is over 25 ohms, take appropriate action to reduce resistance to 25 ohms or less by driving additional ground rods and/or by chemically treating soil encircling ground rods with sodium chloride, calcium chloride, copper sulphate, or magnesium. Then retest to demonstrate compliance.

## SECTION 260470: DISTRIBUTION CIRCUITS

#### PART 1 – GENERAL

- 1.1 DESCRIPTION OF WORK
  - A. Distribution circuit work is indicated by drawings and schedules.
  - B. The distribution circuits shall include furnishing and installing a complete wire and conduit system between distribution panelboards and branch circuit panelboards.
  - C. Types of equipment to be furnished and installed in this section include the following:

Electrical Metallic Tubing (EMT) Wires and Cables Junction Boxes Pull Boxes Conduit Bodies Bushings Locknuts Supporting Devices

# PART 2 – PRODUCTS

- 2.1 DISTRIBUTION CIRCUITS
  - A. Furnish and install each distribution circuit indicated, with assembly of materials, including but not necessarily limited to, conduit, wire, pull boxes, junction boxes and other items and accessories needed for a complete installation. Where materials or components are not otherwise indicated, comply with NEC, NEMA and established industry standards for applications indicated.

# PART 3 – EXECUTION

## 3.1 INSTALLATION OF DISTRIBUTION CIRCUITS

- A. Install distribution circuits complying with equipment manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Multiple circuits within a single raceway shall not be permitted under this section.

# SECTION 260471: FEEDER CIRCUITS

## PART 1 – GENERAL

- 1.1 DESCRIPTION OF WORK
  - A. Feeder circuit work is indicated by drawings and schedules.
  - B. The feeder circuits shall include furnishing and installing a complete wire and conduit system between distribution panelboards and major 3 phase loads, between power panels and 3 phase motor loads.
  - C. Types of equipment to be furnished and installed in this section include the following:

Electrical Metallic Tubing (EMT) Wires and Cables Junction Boxes Pull Boxes Conduit Bodies Bushings Locknuts Supporting Devices

# PART 2 – PRODUCTS

- 2.1 FEEDER CIRCUITS
  - A. Furnish and install each feeder circuit with assembly of materials, including but not necessarily limited to, conduit, wire, pull boxes, junction boxes and other items and accessories needed for a complete installation. Where materials or components are not otherwise indicated, comply with NEC, NEMA and established industry standards for applications indicated.

# PART 3 – EXECUTION

#### 3.1 INSTALLATION OF FEEDER CIRCUITS

- A. Install feeder circuits, complying with equipment manufacturer's written instructions, applicable requirements of NEC, NEMA and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Multiple circuits within a single raceway shall not be permitted under this section.

## SECTION 260472: BRANCH CIRCUITS

### PART 1 – GENERAL

- 1.1 DESCRIPTION OF WORK
  - A. Branch circuit work is indicated by drawings.
  - B. The branch circuits shall include furnishing and installing a complete wire and conduit or cable system between panelboards and lighting fixtures, receptacles, fractional horsepower motors, and small single phase loads.
  - C. Types of equipment to be furnished and installed in this section include the following:

Rigid Raceways – See Section 260110 Electrical Metallic Tubing (EMT) MC (Metal Clad) (Concealed Work only) Wires and Cables Junction Boxes Pull Boxes Conduit Bodies Bushings Locknuts Supporting Devices

### PART 2 – PRODUCTS

### 2.1 BRANCH CIRCUITS

A. Furnish each branch circuit with an assembly of materials, including but not necessarily limited to, conduit, wire, cable, pull boxes, junction boxes and other items and accessories needed for a complete installation. Where materials or components are not otherwise indicated, comply with NEC, NEMA and established industry standards for applications indicated.

#### 2.2 CONVENIENCE BRANCH CIRCUITS

- A. Intent:
  - 1. The intent of this portion of the specifications is to describe the requirements of a convenience circuit as it applies to 120-volt receptacles.
  - 2. All convenience branch circuits may consist of more than one 120 volt receptacle.
- B. Convenience Circuit General: A circuit consisting of a phase and neutral conductor, which may share its neutral with other phase conductors provided that the neutral conductor does not become overloaded due to circuit phase relationship. This type of circuit shall also include an equipment grounding conductor as described under the grounding section of the specifications.

C. Convenience Circuit - Dedicated: A circuit consisting of a phase and neutral conductor which DOES NOT share conductors with any other circuits. This type of circuit shall also include an equipment grounding conductor as described under the grounding section of the specifications.

# PART 3 – EXECUTION

# 3.1 INSTALLATION OF BRANCH CIRCUITS

- A. Install branch circuits, complying with equipment manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Multiple circuits within a single raceway or cable shall be permitted under this section. It shall be the responsibility of the Electrical Contractor to assure that the neutral conductors do not become overloaded due to circuit phase relationship, and isolated grounds not become voided or compromised due to miswiring or wrong connections.
- C. The Electrical Contractor may elect to use metal clad cable in lieu of electrical metallic tubing (EMT) in wall cavities, and/or above tile or dry wall ceilings. In all areas of exposed construction, electrical metallic tubing (EMT) shall be installed.

# SECTION 260510: BUILDING LIGHTING

PART 1 – GENERAL

- 1.1 DESCRIPTION OF WORK
  - A. Lighting fixture work is indicated by specifications, drawings and schedules.
  - B. Types of lighting fixtures in this section include the following:
    - 1. Fluorescent.
  - C. Applications of lighting fixtures required for the project include the following:
    - 1. General Lighting.
    - 2. Supplementary Lighting.
    - 3. Emergency Lighting.

# 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's data on building lighting fixtures.
- B. Shop Drawings: Submit dimensioned drawings of lighting fixture installations, including but not necessarily limited to, layout, relation to associated panelboards, and connections to panelboards. Submit fixture shop drawings in booklet form with separate sheet for each fixture, assembled in luminaire "type" alphabetical order, with proposed fixture and accessories clearly indicated on each sheet.

# PART 2 – PRODUCTS

# 2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with project specifications and requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  - 1. Refer to "Lighting Fixture Schedule", on the drawings, for fixture types and acceptable manufacturers.
- B. Each lighting fixture type specified represents a specific style and quality of fixture acceptable for this project. Equivalent manufacturers listed are consider to have lighting fixtures which meet or exceed those of the originally specified manufacturer.
- C. The Engineer reserves the right to reject any shop drawing and to request a resubmission should the contractor submit a shop drawing of an equivalent manufacturer which is viewed as being of an incompatible style or inferior quality.
- D. No fixture shop drawing shall be submitted, nor will any be accepted, for any manufacturer which is not specifically listed for that fixture type. When a fixture manufacturer is listed for a specific fixture type, this does not provide him with the right to submit for fixtures he is not listed under.

A bidding Contractor may elect to submit non listed fixtures for the Engineer's review, a minimum of ten (10) working day prior to bid, if the Engineer agrees that the submitted fixture meets the intended design than a written addendum will be issued, if no addendum is issued than the manufacturer shall not submit shop drawings for that fixture type. The Engineer, and only the Engineer shall make the final decision on whether the submitted fixture meets the project's requirements.

E. Should the Contractor be unable to obtain approval of the resubmitted manufacturer, than he should submit a fixture from one of the other equivalent manufacturers listed or from the originally specified manufacturer.

#### 2.2 LIGHTING FIXTURES

- A. Provide lighting fixtures of the size, type and rating indicated complete with, but not necessarily limited to, housings, lamp holders, reflectors, ballast, lamps, mounting frames, pendants and wiring; wired and connected in place, complete, tested and left in satisfactory operating condition.
- B. Fluorescent Lamp Ballasts:

#### Section 1 - Physical Characteristics

- 1. The ballast shall be physically interchangeable with a standard core & coil electromagnetic ballast.
- 2. The electronic ballast shall be provided with integral leads, color coded to ANSI standard C82.11 (latest version).

#### Section 2 - Performance Requirement

- 1. The "High Frequency" electronic ballast shall operate lamps at a frequency of 20 KHz or higher without visible flicker.
- 2. The electronic ballast's input current shall have Total Harmonic Distortion (THD) of less than 20% when used with primary lamp.
- 3. The electronic ballast shall have a Power Factor greater than 98% when used with primary lamp.
- 4. The electronic ballast shall have Lamp Current Crest Factor of less than 1.7, in accordance with lamp manufacturers' recommendations and ANSI C82.11.
- 5. The electronic ballast shall support a sustained short to ground or open circuit of any output lead without damage to the ballast.
- 6. The electronic ballast shall have an audible noise rating of Class A or better.

#### Section 3 - Regulatory Requirements

1. Ballast shall meet the requirements of the Federal Communications Commission Rules and Regulations, Part 18, for non-consumer equipment.

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- 2. The electronic ballast shall meet ANSI C82.11 standards regarding harmonic distortion.
- 3. Ballast shall meet ANSI C62.41 Cat. A for transient protection.
- 4. The electronic ballast shall comply with all applicable state and federal efficiency standards.
- 5. The electronic ballast shall be Underwriters' Laboratories (UL) listed (Class P) and CSA Certified where applicable.

#### Section 4 - Other

- 1. The electronic ballast shall not contain Polychlorinated Biphenyls (PCB's).
- 2. The electronic ballast shall carry a five year (5) warranty.
- C. Fixture Lamps: For the type, number and color of the fixture lamps, refer to the Lighting Fixture Schedule on the drawings.

#### PART 3 – EXECUTION

### 3.1 INSTALLATION OF LIGHTING FIXTURES

- A. Install lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA Standards and with recognized industry practices to ensure that lighting fixtures fulfill requirements of the project.
- B. Install lighting fixtures in removable tile ceilings using 3/8" flexible metal conduit with 3 # 12 awg. conductor. Maximum length of flexible lead shall not exceed 60". Flexible lead shall extend from the fixture to the junction box. The junction box shall be securely fastened to the building structure above the removable tile ceiling and shall not serve more than two (2) lighting fixtures, nor shall the junction box support any of the lighting fixtures.

#### 3.2 LIGHTING FIXTURE MOUNTING

- A. 1' x 4', 2' x 2' and 2' x 4' fluorescent fixtures installed in a removable tile ceiling shall be installed using T-Bar grid safety clips as provided by the fixture manufacturer and as required by the NEC.
- B. 2'x 2' and 2' x 4' fluorescent fixtures installed in a removable tile ceiling shall be installed using support wires at all four corners of the fixture. The support wires shall be carried up to the building structure and securely anchored using screwed or bolted hardware. Pressure type clips will not be acceptable. The Electrical Contractor shall be responsible for installing or having installed these two (2) support wires.

#### 3.3 ADJUST and CLEAN

A. Clean lens, reflectors and interiors of all lighting fixtures of dirt and construction debris upon completion of installation.

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B. Protect installed lighting fixtures from damage during the remainder of the construction period.

#### 3.4 FIELD QUALITY CONTROL

- A. Upon completion of the installation of the lighting fixtures, and after the building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with project requirements. Where possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.
- B. At the time of Substantial Completion, replace lamps in lighting fixtures which are observed to be noticeably dimmed after Contractor's use and testing, as judged by the Architect/Engineer. Furnish stock or replacement lamps amounting to 15% (but not less than one (1) lamp in each case) of each type and size used in each type of fixture. Deliver the replacement stock as directed to the Owner's storage area.
  - 1. Refer to Division 1 sections for the replacement/restoration of lamps in lighting fixtures, where used for temporary lighting prior to the time of Substantial Completion.
- C. Replace defective and burned out lamps for a period of one (1) year following the time of Substantial Completion.

### 3.5 GROUNDING

A. Provide tight equipment grounding connections for each lighting fixture installation, in accordance with fixture manufacturer's recommendations and the NEC's requirements.

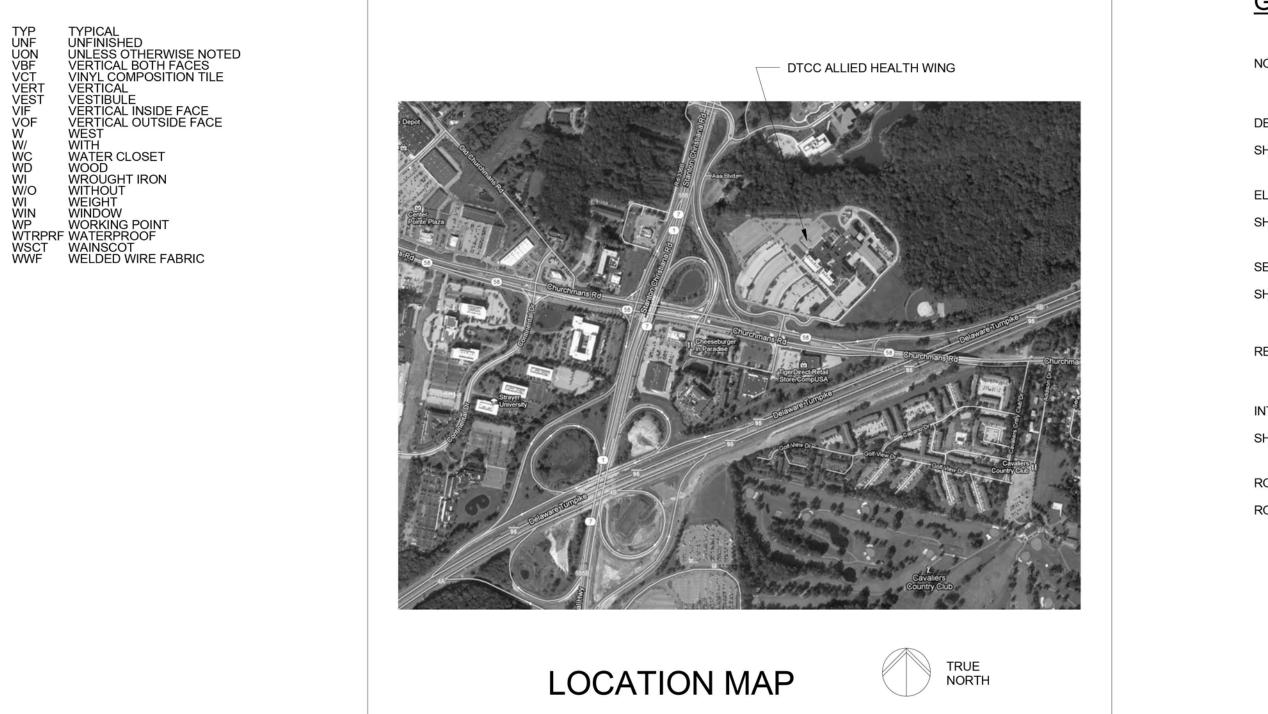
END OF SECTION 260510

### ABBREVIATIONS HIF HORIZONTAL INSIDE FACE HM HOLLOW METAL HOE HORIZONTAL OUTSIDE FACE HORIZ HORIZONTAL HP HIGH POINT HR HOUR ID INSIDE DIAMETER (DIM.) IN INCH INSUL INSULATION INT INTERIOR INV INVERT JAN JANITOR JT JOINT JST JOIST LAB LABORATORY LAM LAMINATE LAV LAVATORY LKR LOCKER LLO LONG LEG OUT LF LOW POINT LT LIGHT LTG LIGHTING LW LONG WAY MAS MASONRY MAT MATERIAL MAX MAXIMUM MECH MECHANICAL MED MEDIUM MEMB MEMBRANE MTL METAL MFR MANUFACTURER MH MANHOLE MIN MINIMUM MIRC MISCELLANEOUS MO MASONRY OPENING MT MARBLE THRESHOLD MTD MOUNTED MUL MULLION N NORTH NIC NOT IN CONTRACT NO R # NUMBER NOM NOMINAL NTS NOT TO SCALE OC ON CENTER OD OUTSIDE DIAMETER (DIM.) OFF OFFICE OD OUTSIDE DIAMETER (DIM.) OFF OFFICE PLAM PLASTIC LAMINATE PLAM PLASTIC POTO PR PAIR PSP POUNDS / SQ. INCH AB ANCHOR BOLT ACOUS ACOUSTICAL ACT ACOUSTICAL CEILING TILE AD AREA DRAIN ADJ ADJUSTABLE AFF ABOVE FINISHED FLOOR AGGR AGGREGATE A.I.B. AIR INFILTRATION BARRIER ALUM ALUMINUM ALT ALTERNATE APPROX APPROXIMATE ARCH ARCHITECTURAL BD BOARD BOF BOTTOM OF FOOTING BITUM BITUMINOUS BLDG BUILDING BLMG BLOCKING BM BEAM BOS BOTTOM OF STEEL BOT BOTTOM BRG BEARING BU BUILT-UP BW BOTH-WAYS CAB CABINET CAV CAVITY CB CATCH BASIN CEM CEMENT CER CERAMIC CI CAST INDELACE TYP UNF UON VEF VERT VEST VIF VIF W POINT PAINTED PAVEMENT QUARRY TILE RISER RADIUS DRAWING DRAWER EAST EACH EXPANSION BOLT EXPANSION JOINT HORIZONTAL INSIDE FACE DWG PT PTD PVMT ELECTRICAL ELEVATION EMERGENCY ENCLOSURE ROOF DRAIN REFERENCE REFLECTED ELEV EMER ENCL REFLECTED REFRIGERATOR REGISTER REINFORCED REQUIRED RESILIENT RETURN REVISED ROOM ROUGH OPENING RAIN WATER CONDUCTOR REDWOOD SQUARE FOOT SOUTH SOLID CORE SCHEDULE EQUAL EQUIPMENT EACH WAY ELECTRIC WATER COOLER EXPANSION EXISTING EXPOSED EXTERIOR EIDE ALADM EQUIP EW EWC EXP EXIST EXPO EXT REV RM RO RWC RWD SF FIRE ALARM FURNISHED BY OTHERS FLOOR DRAIN FOUNDATION EXTINGUISHER EVEN EXTINGUISHER FBO FDN SC HED SECT SH SHR SHT SIM SLO SPEC SPM SPC FIRE EXTINGUISHER FIRE EXTINGUISHER CABINET FACTORY FINISH FIRE HOSE CABINET FINISH FLOOR SCHEDULE SECTION FEC SECTION SILL HEIGHT SHOWER SHEET SIMILAR SHORT LEG OUT SPACES SPECIFICATION SINGLE PLY MEMBRANE SQUARE STAINLESS STEEL STONE FHC FIN CATCH BASIN CEMENT CERAMIC CAST IRON CAST-IN-PLACE CONTROL JOINT CENTER LINE CEILING CLOSET CEILING HEIGHT CLEAR CONCRETE MASONRY UNIT COUNTER COLUMN CONCRETE CONNECTION CONSTRUCTION CONSTRUCTION CONSTRUCTION CONSTRUCTION CONTINUOUS CONTRACTOR CORRIDOR CASEWORK CERAMIC TILE COUNTERSUNK DOUBLE DEPARTMENT DETAIL DRINKING FOUNTAIN DIAMETER DIMENSION DISPENSER DOWN DRAINAGE DOWNSPOUT FLUORESCENT FLUORESCENT FACE OF CONCRETE FACE OF FINISH FACE OF MASONRY FACE OF STUDS F FIREPROOF FULL SIZE FOOT OR FEET G FOOTING JRR FURRING UT FUTURE GALV GALVANIZED GB GRAB BAR GL GLASS GND GROUND GR GRADE CIP CLO CLA CLA CMU CNTR CONC CONC CONST CONTR CORR CORR CORR CTSK DBL DEPT DET DET DET STONE STATION TANDARD STANDARD STEEL STORAGE ST STRUCTURAL SUSPENDED SHORT WAY SYMMETRICAL TREAD TEMPORARY TELEPHONE TERRAZZO TONGUE AND GROOVE THICK TOP OF CURB TOP OF CONCRETE TOP OF FOOTING TOP OF FOOTING TOP OF MASONRY TOP OF STEEL TOP OF PAVEMENT TELEVISION TOP OF WALL STOR STRUCT SUSP SW SYM GL GND GR GSU GWB GYP GC GROUND GRADE GLAZED STRUCTURAL UNIT GYPSUM WALLBOARD GYPSUM GENERAL CONTRACTOR HEADER HEIGHT HOSE BIB HOOK BOTH ENDS TEMP TER T & G THK TC HH HB HBE HDF HDE HDWD HDWE HGT HOSE BIB HOOK BOTH ENDS HORIZONTAL BOTH FACES HOLLOW CORE HOOK DISCONTINUOUS ENDS TOC TOF TOM TOS DF DIA DIM DISP DN DRAIN DS HARDWOOD HARDWARE HEIGHT ŤŴ

|                 | DRAWING LIST                                     |          |
|-----------------|--|----------|
| Sheet<br>Number | Sheet Name                                       | 100% CDs |
| 100             | COVER  |          |
| S101            | FOUNDATION PLAN                                  | <b>—</b> |
| A101            | PARTIAL FIRST FLOOR -BELOW LABS E203 & E204      |          |
| A111            | PARTIAL SECOND FLOOR - LABS E203 & E204          |          |
| A121            | PARTIAL 1ST & 2ND FLR. RCPS - LABS E203 & E204   | •        |
| A131            | PARTIAL FINISH PLANS - LABS E203 & E204          |          |
| A401            | SCHEDULES & MISC. DETAILS                        |          |
| A402            | INTERIOR ELEVATIONS - LABS E203 & E204           |          |
| MD200           | SECOND FLOOR - MECHANICAL DEMOLITION PLAN        |          |
| M200            | SECOND FLOOR - MECHANICAL                        |          |
| M300            | ROOF PLAN - MECHANICAL                           |          |
| M500            | SCHEDULES AND DETAILS - MECHANICAL               |          |
| M501            | DETAILS - MECHANICAL                             |          |
| P100            | FIRST FLOOR - FIRE PROTECTION / PLUMBING PLANS   |          |
| P200            | SECOND FLOOR - FIRE PROTECTION / PLUMBING PLANS  |          |
| P500            | SCHEDULES AND DETAILS - PLUMBING                 |          |
| ED100           | PARTIAL FIRST FLOOR - ELECTRICAL DEMOLITION PLAN |          |
| ED200           | SECONMD FLOOR - ELECTRICAL DEMOLITION PLAN       |          |
| E100            | PARTIAL FIRST FLOOR - ELECTRICAL LIGHTING PLAN   |          |
| E200            | SECOND FLOOR - ELECTRICAL PLAN                   |          |
| E300            | ROOF PLAN - ELECTRICAL                           |          |
| E500            | SCHEDULES AND DETAILS - ELECTRICAL               |          |
| and total: 22   | SCHEDULES AND DETAILS - ELECTRICAL               |          |

# **DTCC Allied Health Wing Renovations and Additions:**

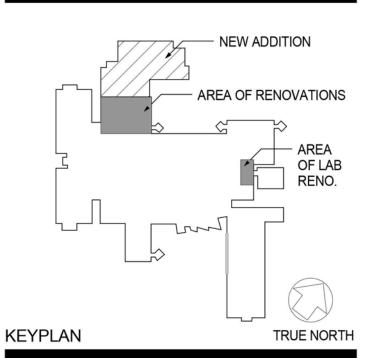
400 Stanton-Christiana Road Newark, DE 19713



| RAPHIC SYMBOLS              |                        |                          |  |                       |         |  |
|-----------------------------|------------------------|--------------------------|--|-----------------------|---------|--|
| ORTH ARROW                  |                        | CEILING IDENTIFICATION   | XXX<br>X-X                                     | CONCRETE MASONRY UNIT |         |  |
| TAIL IDENTIFICATION         | X<br>XX                | DOOR IDENTIFICATION      | xxx  | BRICK                 |         |  |
| EVATION IDENTIFICATION      | $\widehat{\mathbf{x}}$ | WINDOW TYPE              | $\left< \frac{\mathbf{X}}{\mathbf{X}} \right>$ | CONCRETE              |         |  |
| IEET NUMBER                 | x<br>xx                | PARTITION IDENTIFICATION | X A-403  | DRAINAGE FILL         |         |  |
| CTION IDENTIFICATION        | x<br>xx                | REVISION NUMBER          | x  | EARTH                 |         |  |
| IEET NUMBER                 |                        | TOILET ACCESSORY         | 8  | INSULATION - BATT     | -222225 |  |
| FERENCE BUBBLE              |                        | ELEVATION MARK           | 9'-0"  | INSULATION - RIGID    |         |  |
| TERIOR ELEV. IDENTIFICATION |                        | CASEWORK REFERENCE TAG   |  | WOOD - ROUGH          |         |  |
| IEET NUMBER                 |                        | CASEWORK REFERENCE TAG   |  | WOOD - FINISH         |         |  |
| DOM NAME<br>DOM NUMBER      | ROOM NAME<br>XXX       |                          |  | PLYWOOD               |         |  |
| RO                          | OM NAME                |                          |  | STEEL                 |         |  |
|                             |                        | ALL FIN.                 |  | STONE                 |         |  |
|                             |                        |                          |  |                       |         |  |
| BASE FIN.                   |                        |                          |  |                       |         |  |
|                             |                        |                          |  |                       |         |  |

# 100% CDs / ISSUED FOR BID 07.22.2014

| No. | Description                  | Date    |
|-----|------------------------------|---------|
|     | ISSUED FOR BID               | 6-30-14 |
| 1.  | ADDENDUM #1 - ISSUED FOR BID | 7-22-14 |
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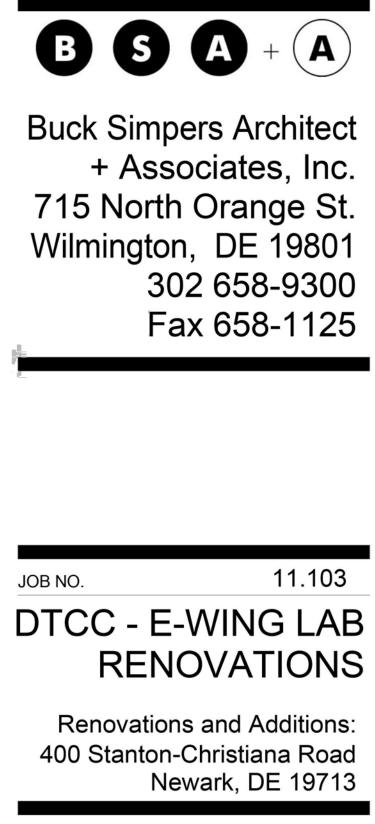
Site/Civil Landmark/JCN 100 W. Commons Blvd., Suite 301 New Castle, DE 19720 302.323.9377

MEF

Furlow Associates, Inc. 1206 Society Drive Claymont, DE 19703 302.798.3515

Structural Engineer MacIntosh Engineering 300 Delaware Avenue, Suite 820 Wilmington, DE 19801 302.252.9200

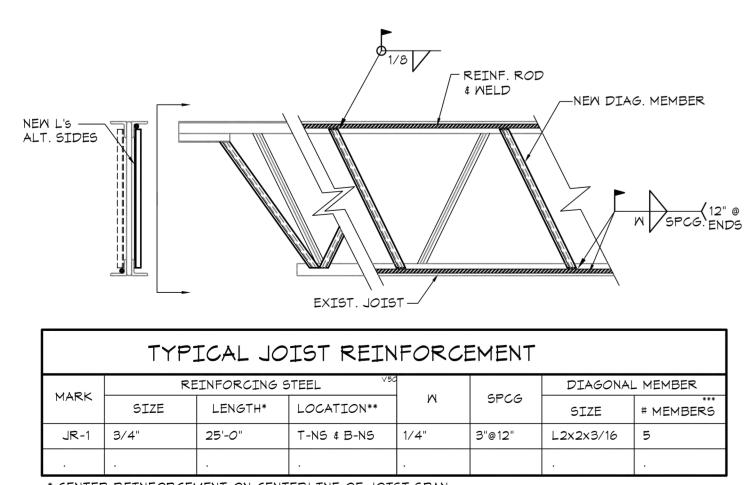
IT/Multimedia Convergent Technologies 6501 York Road Baltimore, MD 21212 410.532.2395

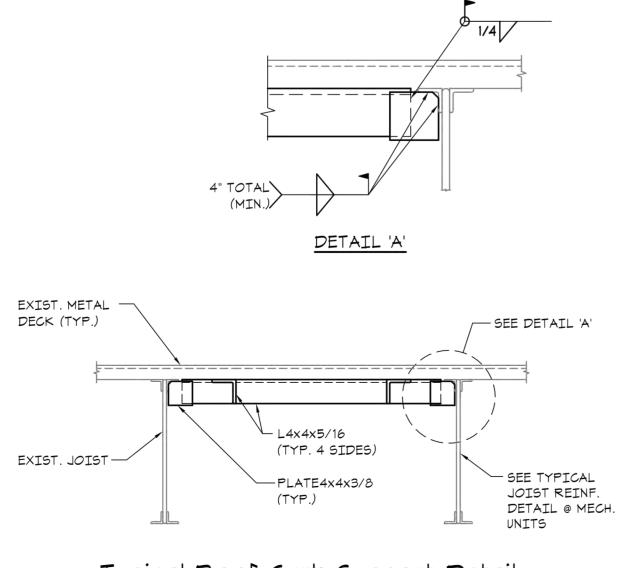


COVER

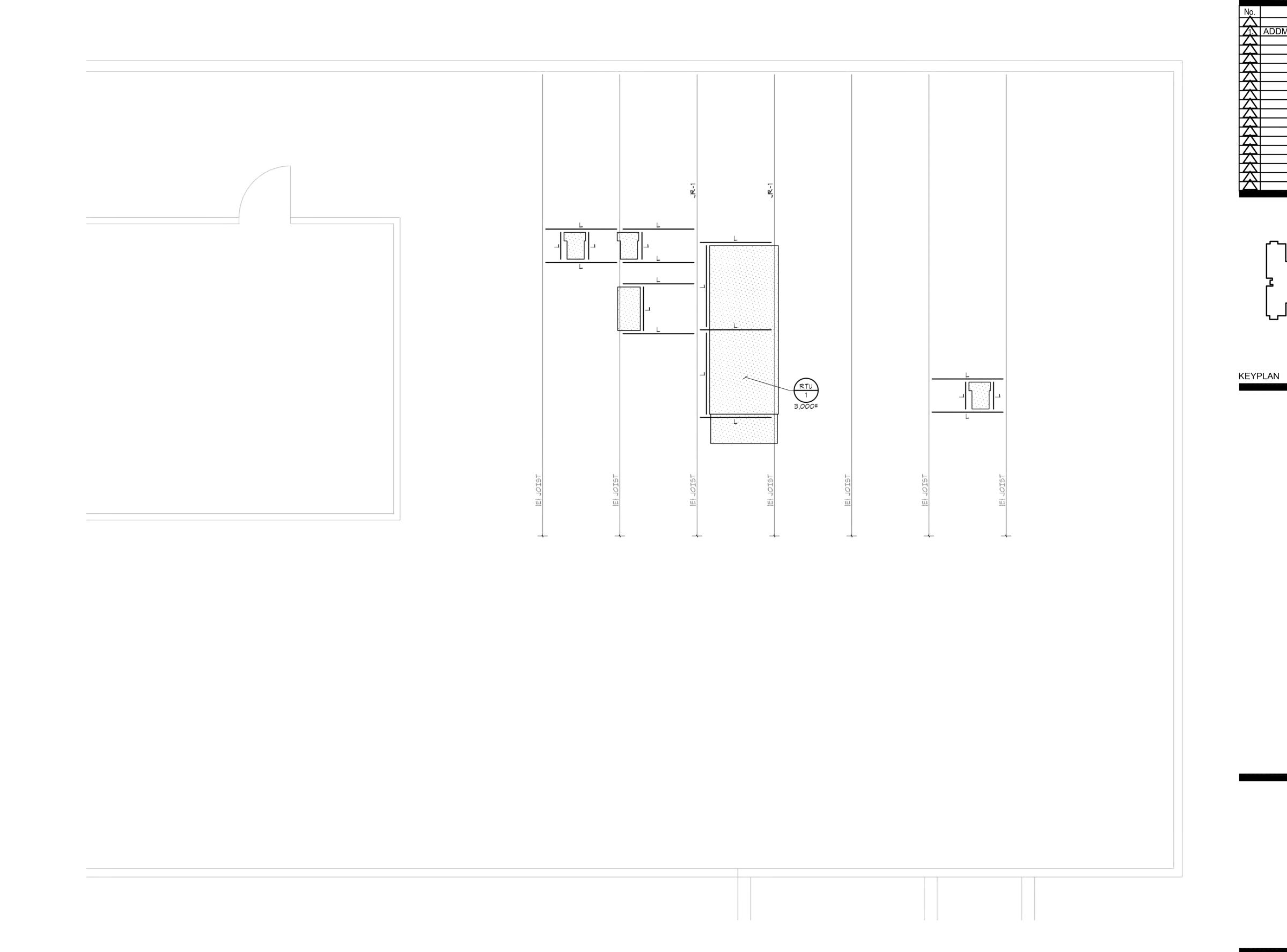
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| GENERAL                      |   |
|------------------------------|---|
| PARAGRAPH                    | NOTES   |
| G1                           | ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH ALL DRAWINGS AND SPECIFICATIONS CONTAINED HEREIN.  |
| G2                           | ALL WORK RELATED TO THE STAGING, CONSTRUCTION PRACTICES, AND SAFETY OF THE<br>PROJECT'S WORKERS AND PROPERTY SHALL BE CONSIDERED MEANS AND METHODS AND<br>SHALL BE COMPLETED BY THE CONTRACTOR IN ACCORDANCE WITH STANDARD INDUSTRY<br>PRACTICE AND ALL CODES AND STANDARDS. VISITS TO THE SITE MADE BY THE<br>ENGINEER ARE FOR THE REVIEW OF THE STRUCTURAL WORK FOR GENERAL<br>CONFORMANCE WITH THE DRAWINGS AND SPECIFICATIONS AND ARE NOT FOR THE<br>REVIEW OF CONTRACTOR RESPONSIBILITIES, INCLUDING BUT NOT LIMITED TO<br>PROJECT SAFETY AND MEANS AND METHODS OF CONSTRUCTION. |
| 63                           | SCALING OF DRAWINGS TO DETERMINE DIMENSIONS OF ELEMENTS IS NOT PERMITTED.   |
| G4                           | STRUCTURAL DRAWINGS SHALL NOT BE REPRODUCED TO CREATE SHOP DRAWINGS OR<br>SHORING DOCUMENTATION WITHOUT THE EXPRESS WRITTEN CONSENT OF MACINTOSH<br>ENGINEERING.  |
| G5                           | THE STRUCTURAL DOCUMENTS ARE TO BE USED IN COORDINATION WITH THE<br>ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS AND<br>SPECIFICATIONS AS WELL AS THOSE OF ALL OTHER DISCIPLINES. ANY DISCREPANCIES<br>SHOULD BE BROUGHT TO THE ATTENTION OF THE DESIGN TEAM PRIOR TO THE<br>COMMENCEMENT OF WORK.  |
| 66                           | ALL REQUESTED CHANGES IN WORK BY THE CONTRACTOR ARE SUBJECT TO THE<br>APPROVAL OF THE DESIGN TEAM AND OWNER AND ARE CONSIDERED TO BE COMPLETED<br>AT NO ADDITIONAL COST UNLESS SPECIFICALLY APPROVED. APPROVAL OF REQUESTED<br>CHANGES DOES NOT CONSTITUTE APPROVAL OF AN INCREASE IN PROJECT COSTS.  |
| GT                           | REFER TO THE ARCHITECTURAL DOCUMENTATION FOR LOCATION, EXTENT, AND<br>DETAILING OF ALL WATERPROOFING AND FIREPROOFING.  |
| SHOP DRAWING<br>REQUIREMENTS |   |
| SD1                          | NOTES<br>SHOP DRAWINGS SHALL BE SUBMITTED FOR THE FOLLOWING ITEMS FOR THIS THE<br>PROJECT:  |
| SD1.1                        | STEEL FRAMING & REINFORCING   |
| SD2                          | ALL SHOP DRAWINGS NOTED ABOVE SHALL BE SUBMITTED IN A TIMELY MANNER TO<br>ALLOW FOR A 10 BUSINESS DAY REVIEW PERIOD BY THE DESIGN TEAM. ALL SUBMITTED<br>DRAWINGS SHALL CONTAIN THE CONSTRUCTION MANAGER REVIEW STAMP.  |
| SD3                          | SHOP DRAWINGS MAY BE SUBMITTED ELECTRONICALLY, HOWEVER, A MINIMUM OF ONE (1)<br>HARD COPY SHALL BE PROVIDED FOR ALL SHOP DRAWINGS. IF NO HARD COPY IS<br>PROVIDED, PRINTING AND TIME COSTS WILL BE CHARGED TO ORGANIZE AND PRINT<br>SHOP DRAWINGS.  |
| SD4                          | ELECTRONIC SHOP DRAWINGS SHALL BE SUBMITTED AS AN ORGANIZED SINGLE FILE<br>DOCUMENT. DRAWINGS SHALL BE ORGANIZED IN NUMERIC ORDER WITH ALL REFERENCED<br>PLANS LOCATED FIRST IN THE SUBMITTAL.  |
| SD5                          | SHOP DRAWINGS WILL BE MARKED AS NOTED ON THE REVIEW STAMP. SHOP DRAWINGS<br>MARKED "MAKE CORRECTIONS NOTED" ARE TO BE RE-SUBMITTED FOR RECORD<br>PURPOSES AND WILL NOT BE RE-REVIEWED AS AN ADDITIONAL SUBMITTAL. REVIEW OF<br>"MAKE CORRECTIONS NOTED" SHOP DRAWINGS BEYOND ONE RE-SUBMITTAL WILL<br>REQUIRE ADDITIONAL FEE.   |
| EXISTING<br>CONSTRUCTION     |   |
| PARAGRAPH                    | NOTES   |
| E1                           | THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, COORDINATION AND<br>INSTALLATION OF SHORING AND STABILIZATION OF EXISTING CONSTRUCTION AS<br>REQUIRED TO PERFORM THE WORK CONTAINED IN THE DRAWINGS AND<br>SPECIFICATIONS.  |
| E2                           | DIMENSIONS SHOWN REFERRING TO EXISTING STRUCTURES ARE FOR REFERENCE ONLY.<br>ALL DIMENSIONS RELATED TO EXISTING BUILDINGS AND FRAMING SHOULD BE<br>VERIFIED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORK.  |
| E3                           | THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY INFORMATION RELATING TO<br>THE EXISTING STRUCTURE THAT HAS BEEN UNCOVERED DUE TO DEMOLITION AND<br>REMOVAL OF FINISHES.   |
| E4                           | PRIOR TO COMMENCEMENT OF WORK ON EXISTING STRUCTURES TO REMAIN OR<br>ADJACENT STRUCTURES, A STRUCTURAL SURVEY SHALL BE COMPLETED AT THE<br>CONTRACTOR'S EXPENSE. REPORT SHALL INDICATE AND PHOTOGRAPH ANY EXISTING<br>DAMAGE OR DEFICIENCIES IN THE EXISTING STRUCTURES AS WELL AS THEIR<br>CONDITION. REPORT SHALL BE ISSUED TO THE DESIGN TEAM FOR THEIR RECORD.  |
| STEEL                        |   |
| PARAGRAPH                    | NOTES   |
| 51                           | ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE<br>LATEST AISC CODE. ALL STRUCTURAL STEEL WIDE FLANGE (W) SHAPES SHALL BE ASTM<br>A992 GRADE 50 (V50). ALL STRUCTURAL STEEL S, M, AND HP SHAPES SHALL BE ASTM A572<br>GRADE 50 (V50). ALL OTHER STRUCTURAL STEEL SHALL BE ASTM A36 UNLESS OTHERWISE<br>NOTED.   |
| 52                           | ALL SHOP AND FIELD WELDING SHALL BE PERFORMED BY WELDERS CERTIFIED, AS<br>DESCRIBED IN "LATEST EDITION OF THE AMERICAN WELDING SOCIETY'S STANDARD<br>QUALIFICATION PROCEDURE", AWS D1.1, TO PERFORM THE TYPE OF WORK REQUIRED.  |
| 53                           | FABRICATOR SHALL ADHERE TO ALL OSHA FEDERAL REGISTER STANDARDS SECTION<br>1926.777 WITH REGARD TO CONNECTION DESIGN.  |
| 54                           | ALL STEEL WELDING RODS SHALL BE AS FOLLOWS:   |
| 55                           | ETOXX FOR STEEL CONNECTIONS   |
| 56                           | SUBMIT ALL STEEL SHOP DRAWINGS FOR REVIEW PRIOR TO ANY FABRICATION.   |
| 57                           | STEEL FABRICATOR IS SOLELY RESPONSIBLE FOR COORDINATING WITH THE GENERAL<br>CONTRACTOR FOR THE PURPOSE OF SURVEYING AND VERIFICATION OF EXISTING<br>CONDITIONS INCLUDING BUT NOT LIMITED TO THE LOCATION, ELEVATION, AND<br>DIMENSIONS OF WALLS AND FRAMING THAT EXIST AT THE TIME OF THE STEEL<br>ERECTION.  |





\* CENTER REINFORCEMENT ON CENTERLINE OF JOIST SPAN \*\* T-TOP, B-BOTTOM, NS-1 SIDE, BS-2 SIDES \*\*\* NUMBER OF DIAGONAL MEMBERS FROM EACH END

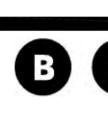


# PARTIAL EXISTING ROOF FRAMING PLAN NOTES:

1. 'JR-1' INDICATES EXISTING ROOF BAR JOIST TO BE REINFORCED. SEE SCHEDULE ON THIS SHEET FOR ADDITIONAL INFORMATION. 2. 'L' INDICATES L4X4X3/8 SUPPORT LOCATED UNDER NEW MECHANICAL CURB AS REQUIRED. SEE 'TYPICAL ROOF CURB SUPPORT DETAIL'.

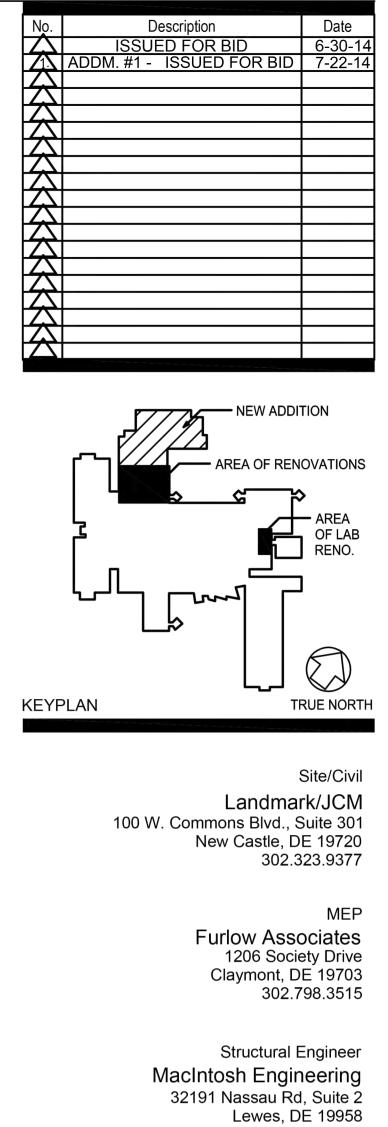
SCALE: 1/4" = 1'-0"

Typical Roof Curb Support Detail (PROVIDE AT PERIMETER OF ALL ROOFTOP MECHANICAL UNITS)



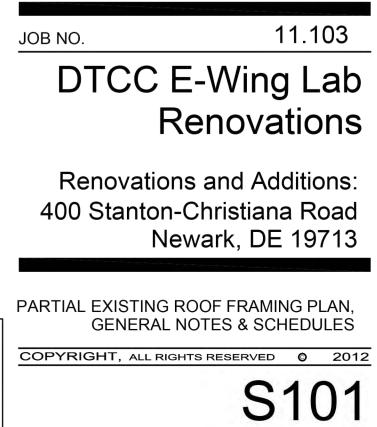
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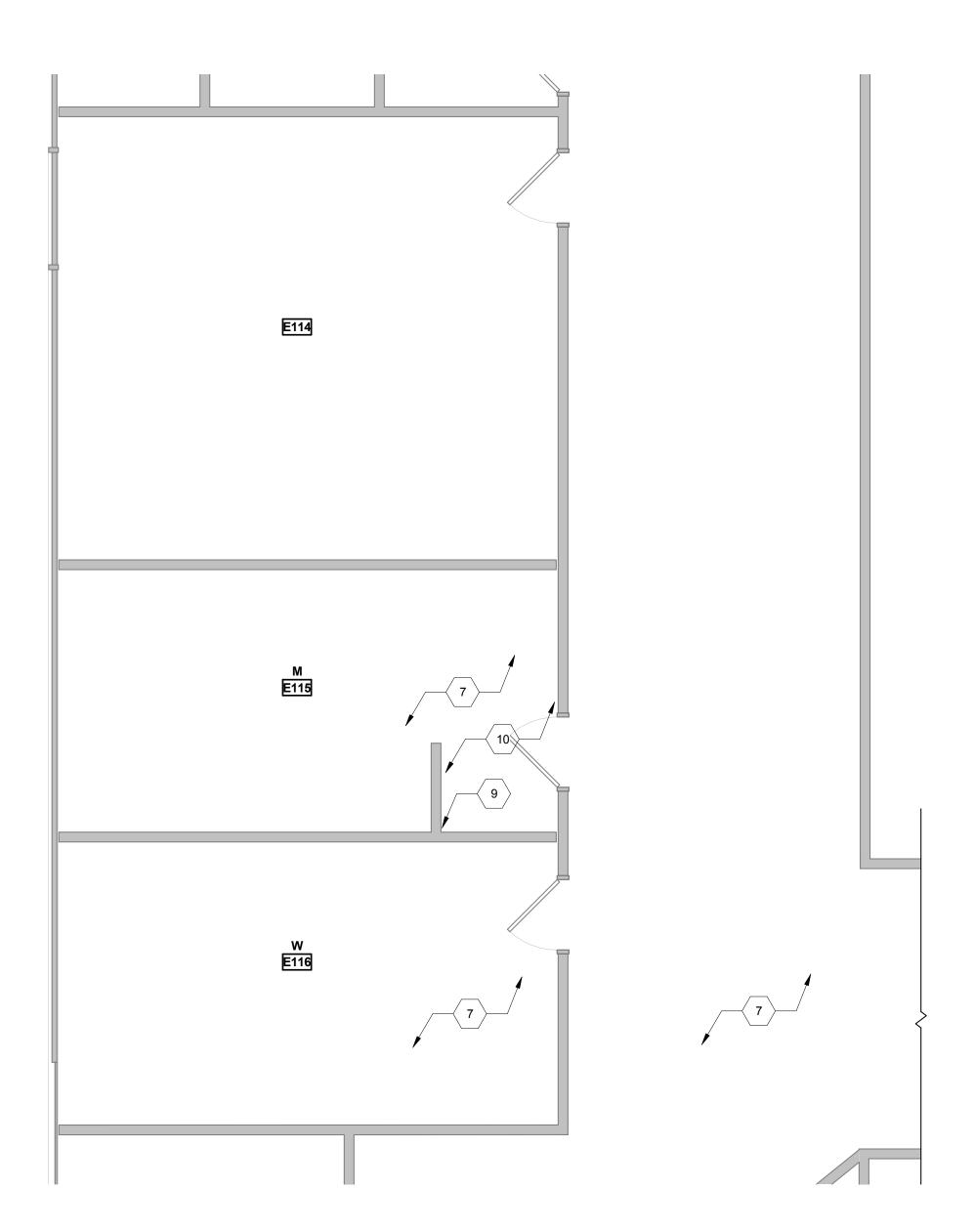
THIS DOCUMENT IS THE SOLE PROPERTY OF MACINTOSH ENGINEERING AND MAY NOT BE REPRODUCED IN ANY FORM FOR THE PURPOSE OF SHOP DRAWING PREPARATION WITHOUT THE PRIOR WRITTEN PERMISSION OF MACINTOSH ENGINEERING



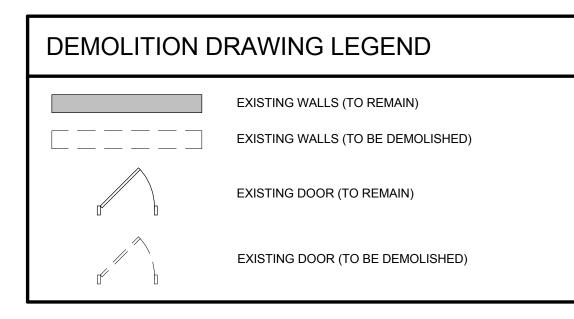
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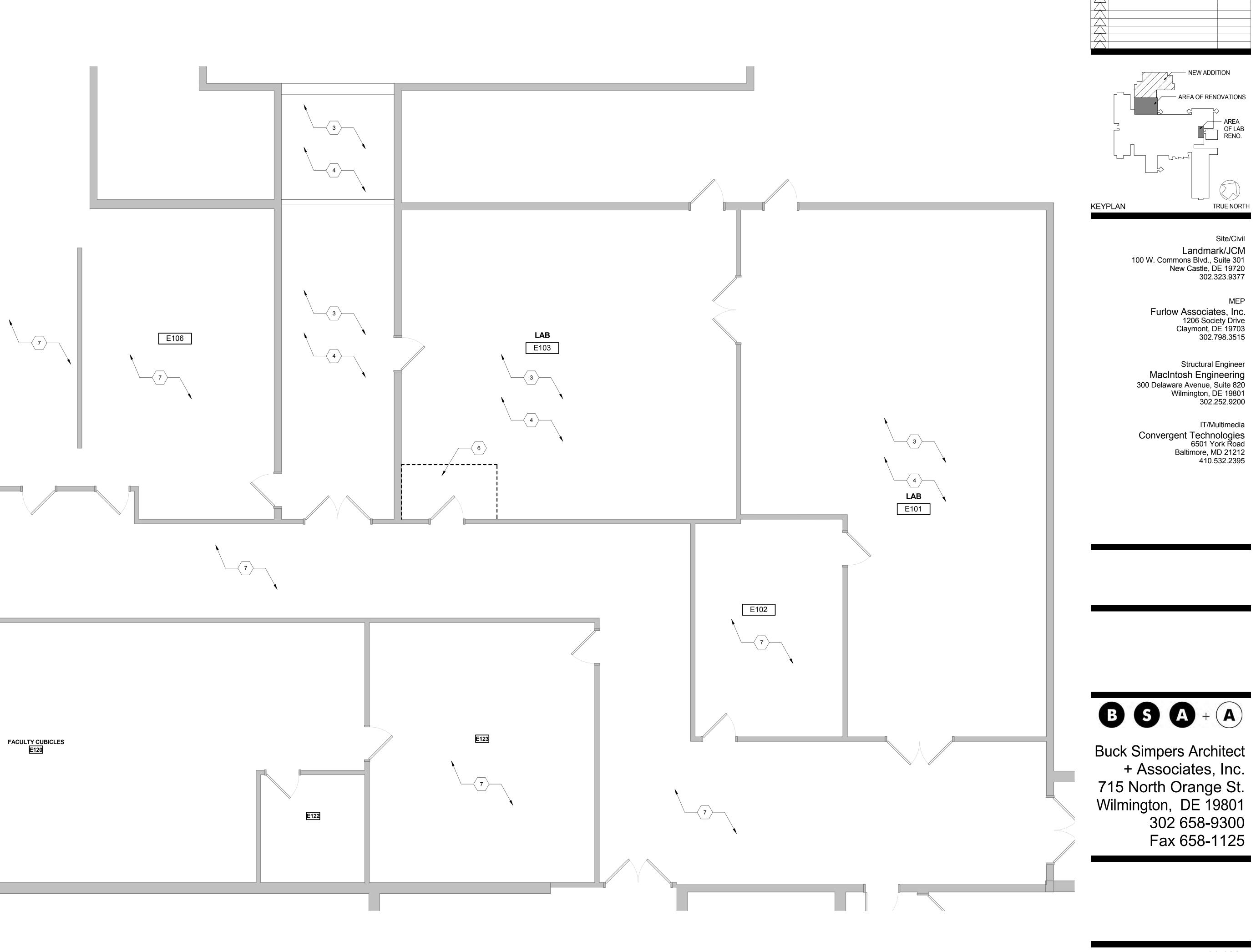




2 PARTIAL FIRST FLOOR PLAN - BELOW LABS - DEMOLITION 1/4" = 1'-0"

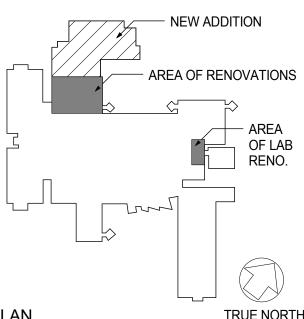


| DEMOLITION KEY NOTES |  |  |  |  |
|----------------------|--|--|--|--|
| $\langle 1 \rangle$  | EXISTING WALL TO BE DEMOLISHED IN ITS ENTIRETY. PATCH AND REPAIR ANY DISTURBED EXISTING TO REMAIN CONSTRUCTION AS REQUIRED.  |  |  |  |
| <b>2</b>             | REMOVE EXISTING DOOR, FRAME, HARDWARE IN ITS ENTIRETY. PATCH AND REPAIR ANY DISTURBED EXISTING TO REMAIN CONSTRUCTION AS REQUIRED.   |  |  |  |
| 3                    | REMOVE EXISTING CEILING FINISH INCLUDING BUT NOT LIMITED TO; CEILING<br>GRID, CEILING TILES, LIGHT FIXTURES, AND SPRINKLER HEADS IN THEIR<br>ENTIRETY.   |  |  |  |
| <b>4</b>             | REMOVE EXISTING FLOOR FINISH AND BASE AS REQUIRED FOR THE EXTENT<br>OF NEW WORK. PATCH AND REPAIR FLOOR SURFACE IN PREPARATION OF<br>NEW FLOOR FINISH REOCATE ALL EQUIPMENT AS NECESSARY FOR NEW<br>WORK.  |  |  |  |
| 5                    | DEMOLISH EXISTING WALL AS REQUIRED TO INSTALL NEW DOOR AND FRAME.<br>SEE DOOR SCHEDULE FOR DOOR SIZE AND TYPE.   |  |  |  |
| 6                    | SAW CUT EXISTING SLAB AS REQUIRED. PATCH & REPAIR SLAB AS<br>REQUIRED TO RECEIVE NEW FLOOR FINISH. FLASH PATCH AS REQUIRED.  |  |  |  |
| (7)                  | SELECTIVELY REMOVE CEILING PANELS & CROSS TEES OR PORTION OF<br>CEILING GRID AS REQUIRED FOR NEW WORK. STORE AND PROTECT ALL<br>EXISTING MATERIALS FOR REUSE. PROVIDE NEW CEILING TILES AND CEILING<br>GRID COMPONENTS IF EXISTING IS DAMAGED UPON REMOVAL OR<br>REINSTALLATION. |  |  |  |
| 8                    | SELECTIVELY REMOVE EXTENT OF WALL IN PREPARATION FOR INSTALLATION<br>OF NEW WALL MOUNTED SINK & CARRIER. PATCH & REPAIR TO RECIEVE NEW<br>PAINT FINISH.  |  |  |  |
| 9                    | SELECTIVELY CORE EXISTING SLAB AS REQUIRED FOR ALL NEW WORK.   |  |  |  |
| (10)                 | DEMO WALL AND FLOOR SLAB AS REQ'D FOR NEW PIPE CHASE. REFER TO<br>3/P100 FOR EXTENT OF DISTURBANCE. PATCH, REPAIR, OR PROVIDE STL.<br>STUD CHASE WITH INSULATION & DRYWALL AS REQ'D TO RECEIVE NEW<br>FINISHES IF NECESSARY.   |  |  |  |



# 1 PARTIAL FIRST FLOOR PLAN - BELOW LABS E203 & E204 - DEMOLITION 1/4" = 1'-0"

| No.                 | Description                       | Date    |
|---------------------|-----------------------------------|---------|
|                     | 100% CDs ISSUED FOR BID           | 6-13-14 |
| /1.                 | ADDM #1 - 100% CDs ISSUED FOR BID | 7-22-14 |
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# EQUIPMENT LEGEND

E-01 GOGGLE CABINET - A COMPARABLE PRODUCT TO; CIFLAB SOLUTIONS PRODUCT SA600 (GROUNDED ELEC. REQUIRED) E-02 36" x 23" X 84"H. CABINET WITH GLASS DOORS - A COMPARABLE PRODUCT TO; CIFLAB SOLUCTION E LINE CASEWORK PRODUCT T0300 E-03 24" x 24" H. WALL MOUNTED PEG BOARD - A COMPARABLE PRODUCT TO;

CIFLAB SOLUTIONS PRODUCT SP550 E-04 DEMO DESK - A COMPARABLE PRODUCT TO; DIVERSIFIED WOODCRAFTS PRODUCT 1114K (WITH OUT SUPPORT BARS AND CROSS ROD). FOR WOOD FINISH REFER TO SPECIFICATIONS.

E-05 CHEMICAL STORAGE CABINET - A COMPARABLE PRODUCT TO; JUSTRITE PRODUCT 893300

E-06 PORTABLE DEMO DESK - A COMPARABLE PRODUCT TO; DIVERSIFIED WOODCRAFTS PRODUCT 4352KF. FOR WOOD FINISH REFER TO SPECIFICATIONS. E-07 24" X 23" X 84" H. CABINET WITH ADJUSTABLE SHELVES - A COMPARABLE PRODUCT TO; CFILAB SOLUTIONS PRODUCT T0110 E-08 24" X 16" X 84" H. SKELETON CABINET - A COMPARABLE PRODUCT TO; CFILAB SOLUTIONS E LINE CASEWORK PRODUCT T0T0780

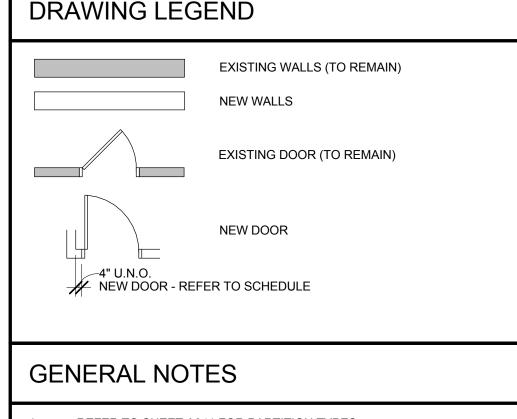
E-09 48" X 16" X 84" H. LOCKABLE STORAGE CABINET - A COMPARABLE PRODUCT TO; CFILAB SOLUTIONS E LINE CASEWORK PRODUCT T0100 E-10 FLOOR TO CEILING CHEMICAL CABINET WITH EXHAUST - REQUIRES

# **GENERAL NOTES**

VENTING

REFER TO SPECIFICATIONS FOR BASIS OF DESIGN FOR SCIENCE CABINETRY. CABINET HARDWARD TO BE 4" STAINLESS WIRE PULL - A COMPARABLE PRODUCT TO CFILAB SOLUTIONS PULL # DP190.

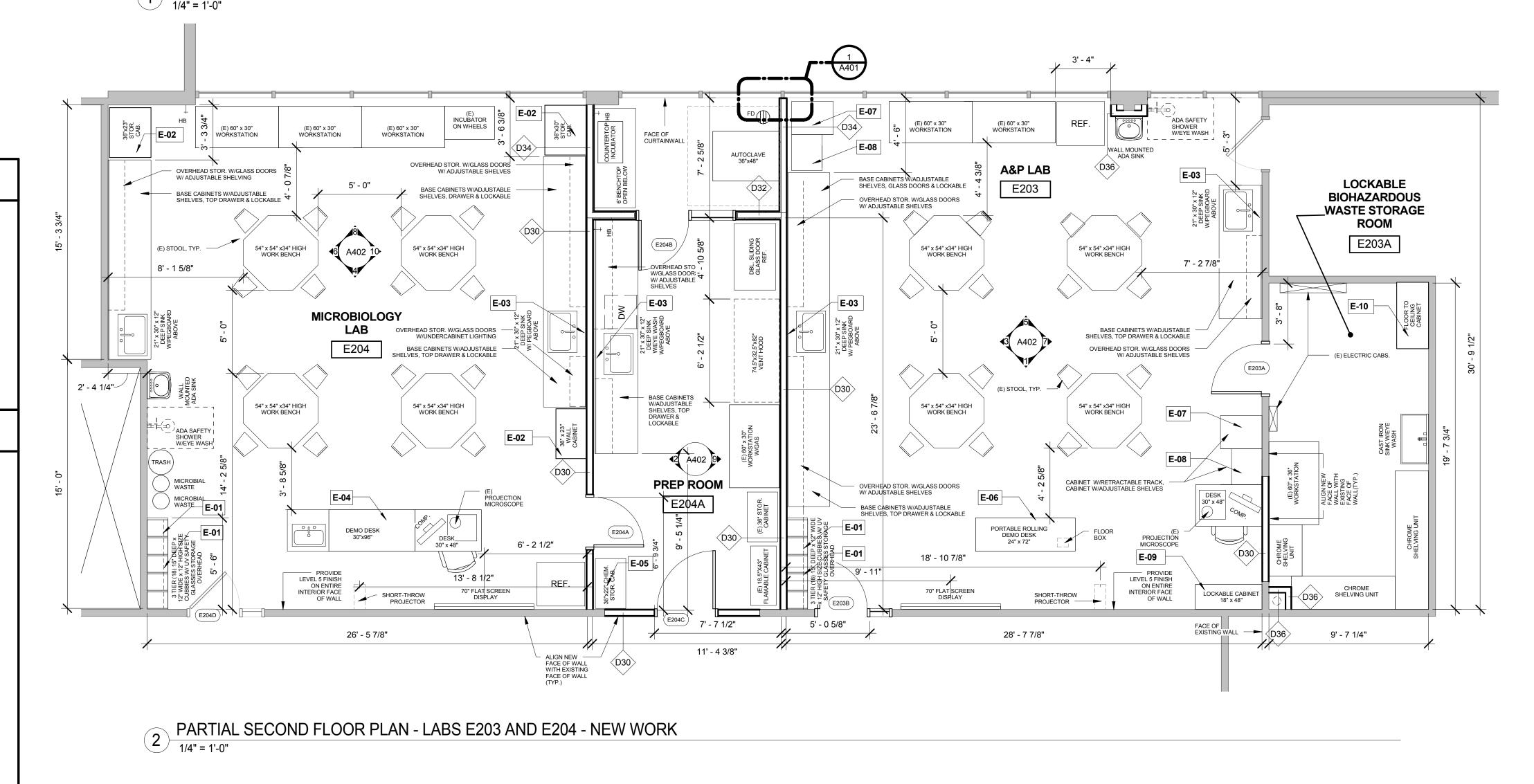
# DRAWING LEGEND



- REFER TO SHEET A941 FOR PARTITION TYPES. DIMENSIONS ARE FROM FACE OF STUD/CMU/EXISTING PARTITION, U.O.N.
- REFER TO DEMOLITION PLANS FOR ADDITIONAL WORK TO EXIST. BUILDING. ALL COLUMN LOCATIONS ARE TO BE VERIFIED IN FIELD. TYP.
- CONTRACTORS SHALL FIELD VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ARCHITECT IMMEDIATELY, PRIOR TO THE COMMENCEMENT OF WORK.
- COORDINATE ALL DOOR AND WINDOW OPENING DIMENSIONS WITH DOOR AND WINDOW DETAILS. EXPANSION JOINTS SHOWN OR NOTED SHALL BE CONTINUOUS
- THROUGH ALL ELEMENTS OF CONSTRUCTION, INCLUDING BUT NOT LIMITED TO ELEVATED FLOORS, INTERIOR AND EXTERIOR WALLS, PARAPETS, COPINGS (PROVIDE SLIP JOINTS), CEILINGS, AND ROOF. ALL JOINTS AND PENETRATIONS IN SLABS SHALL BE SEALED WITH MATERIAL COMPATIBLE WITH MATERIAL COMPATIBLE WITH FLOOR
- FINISH IN ALL LOCATIONS. REFER TO STRUCTURAL DRAWINGS FOR LINTELS. AFTER CONSTRUCTION IS COMPLETE CLEAN EXISTING CURTAIN WALLS 10.
- TO REMAIN. 11 PATCH AND REPAIR ALL WORK COMPLETED WITHIN AREAS NOT SHOWN AS REQ'D FOR NEW MEP WORK.
- ALL WALLS THAT RECEIVE A PATCH AND/OR REPAIR SHALL BE FULLY 12. PAINTED TO NEAREST CORNER IN EACH DIRECTION.
- PROVIDE FRAMED PIPE CHASES AS REQ'D IF NEW PIPE DOES NOT FIT 13. INTO EXISTING WALL CAVITY. EACH TO RECEIVE INSULATION AND BE FINISHED WITH DRYWALL. CONTRACTOR RESPONSIBLE TO PATCH &
  - REPAIR TO MATCH EXISTING ADJACENT WALL FINISHES. IF EXISTING EXPANSION OR CONTROL JOINTS ARE DISTURBED CONTRACTOR RESPONSIBLE TO COORDINATE & PROVIDE NEW EXPANSION OR CONTROL JOINTS TO RECEIVE NEW FINISHES AS REQ'D.

|      |   | DEM                 | OLITION KEY NOTI  | ES                                     |                 |
|------|---|---------------------|---|--|-----------------|
|      |   | $\langle 1 \rangle$ | EXISTING WALL TO BE DEMOLISI<br>ANY DISTURBED EXISTING TO RE  |  |                 |
|      |   | 2                   | REMOVE EXISTING DOOR, FRAM<br>REPAIR ANY DISTURBED EXISTIN  | E, HARDWARE IN ITS                     | ENTIRETY. PATC  |
|      |   | 3                   | REMOVE EXISTING CEILING FINIS<br>GRID, CEILING TILES, LIGHT FIXT<br>ENTIRETY.   |  |                 |
|      |   | <b>4</b>            | REMOVE EXISTING FLOOR FINIS<br>OF NEW WORK. PATCH AND REP<br>NEW FLOOR FINISH REOCATE   | AIR FLOOR SURFACE                      | E IN PREPARATIO |
|      |   | 5                   | WORK.<br>DEMOLISH EXISTING WALL AS RI<br>SEE DOOR SCHEDULE FOR DOO  |  | NEW DOOR AND    |
|      |   | 6                   | SAW CUT EXISTING SLAB AS REC<br>REQUIRED TO RECEIVE NEW FL  |  |                 |
|      |   | (7)                 | SELECTIVELY REMOVE CEILING<br>CEILING GRID AS REQUIRED FOF<br>EXISTING MATERIALS FOR REUS<br>GRID COMPONENTS IF EXISTING<br>REINSTALLATION. | R NEW WORK. STORE<br>E. PROVIDE NEW CE | E AND PROTECT A |
|      |   | 8                   | SELECTIVELY REMOVE EXTENT OF NEW WALL MOUNTED SINK &  |  |                 |
|      |   | <b>9</b>            | PAINT FINISH.<br>SELECTIVELY CORE EXISTING SI   | AB AS REQUIRED FO                      | OR ALL NEW WOR  |
|      |   | (10)                | DEMO WALL AND FLOOR SLAB A<br>3/P100 FOR EXTENT OF DISTURE  | ANCE. PATCH, REPA                      | AIR, OR PROVIDE |
|      |   |                     | STUD CHASE WITH INSULATION<br>FINISHES IF NECESSARY.  | A DRIWALL AS REQ L                     | D TO RECEIVE NE |
| 1    | 1 |                     |   |  |                 |
| E204 |   |                     |   |  | E203            |
|      |   |                     |   |  |                 |

PARTIAL SECOND FLOOR PLAN - LABS E203 AND E204 - DEMOLITION 1 PARTIAI 1/4" = 1'-0"



# TIRETY. PATCH AND REPAIR FRUCTION AS REQUIRED. E IN ITS ENTIRETY. PATCH AND

I CONSTRUCTION AS REQUIRED. BUT NOT LIMITED TO; CEILING PRINKLER HEADS IN THEIR

S REQUIRED FOR THE EXTENT JRFACE IN PREPARATION OF ENT AS NECESSARY FOR NEW NSTALL NEW DOOR AND FRAME.

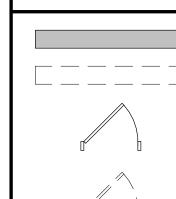
CH & REPAIR SLAB AS FLASH PATCH AS REQUIRED. OSS TEES OR PORTION OF STORE AND PROTECT ALL NEW CEILING TILES AND CEILING

REPARATION FOR INSTALLATION ATCH & REPAIR TO RECIEVE NEW

RED FOR ALL NEW WORK.

NEW PIPE CHASE. REFER TO I, REPAIR, OR PROVIDE STL. S REQ'D TO RECEIVE NEW

# DEMOLITION DRAWING LEGEND

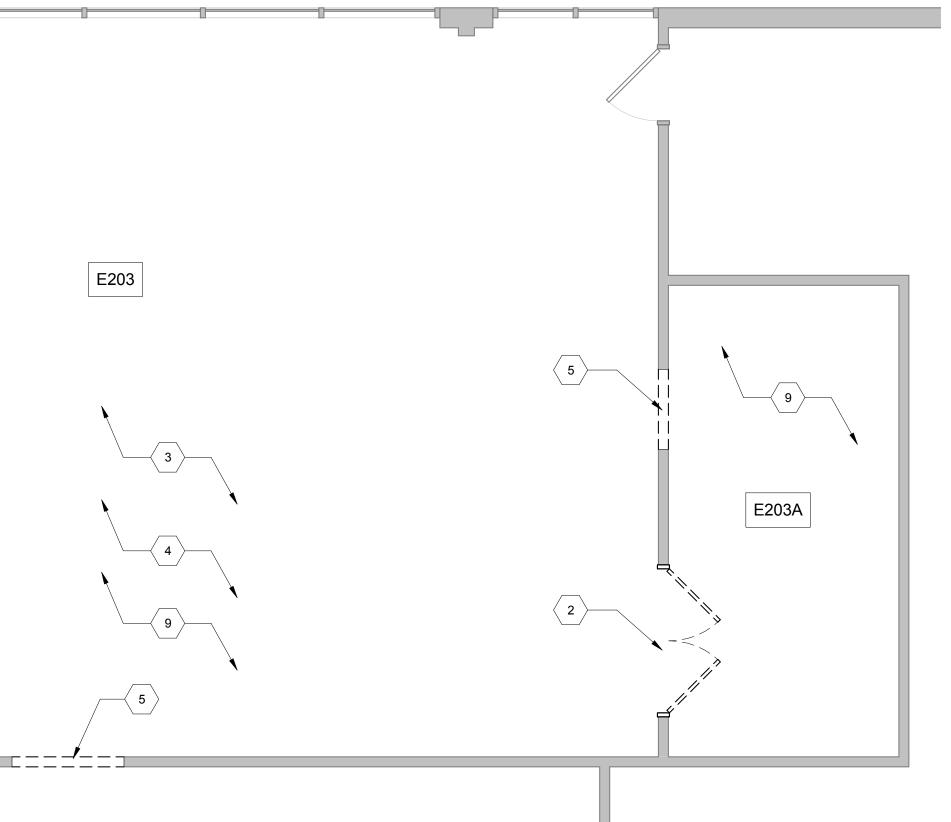


EXISTING DOOR (TO REMAIN)

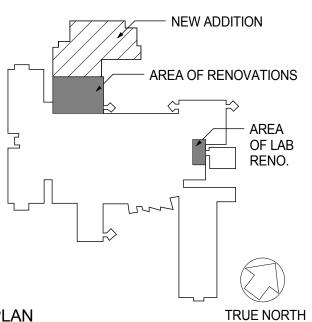
EXISTING WALLS (TO REMAIN)

EXISTING WALLS (TO BE DEMOLISHED)

EXISTING DOOR (TO BE DEMOLISHED)



| No.                 | Description                       | Date    |
|---------------------|-----------------------------------|---------|
| $\wedge$            | 100% CDs ISSUED FOR BID           | 6-13-14 |
| 1.                  | ADDM #1 - 100% CDs ISSUED FOR BID | 7-22-14 |
| $\overline{\Delta}$ |                                   |         |
| $\bigtriangleup$    |                                   |         |
| $\square$           |                                   |         |
| $\Delta$            |                                   |         |
| $\Delta$            |                                   |         |
| $\Delta$            |                                   |         |
| $\square$           |                                   |         |
| $\Delta$            |                                   |         |
| $\square$           |                                   |         |
| $\bigtriangleup$    |                                   |         |



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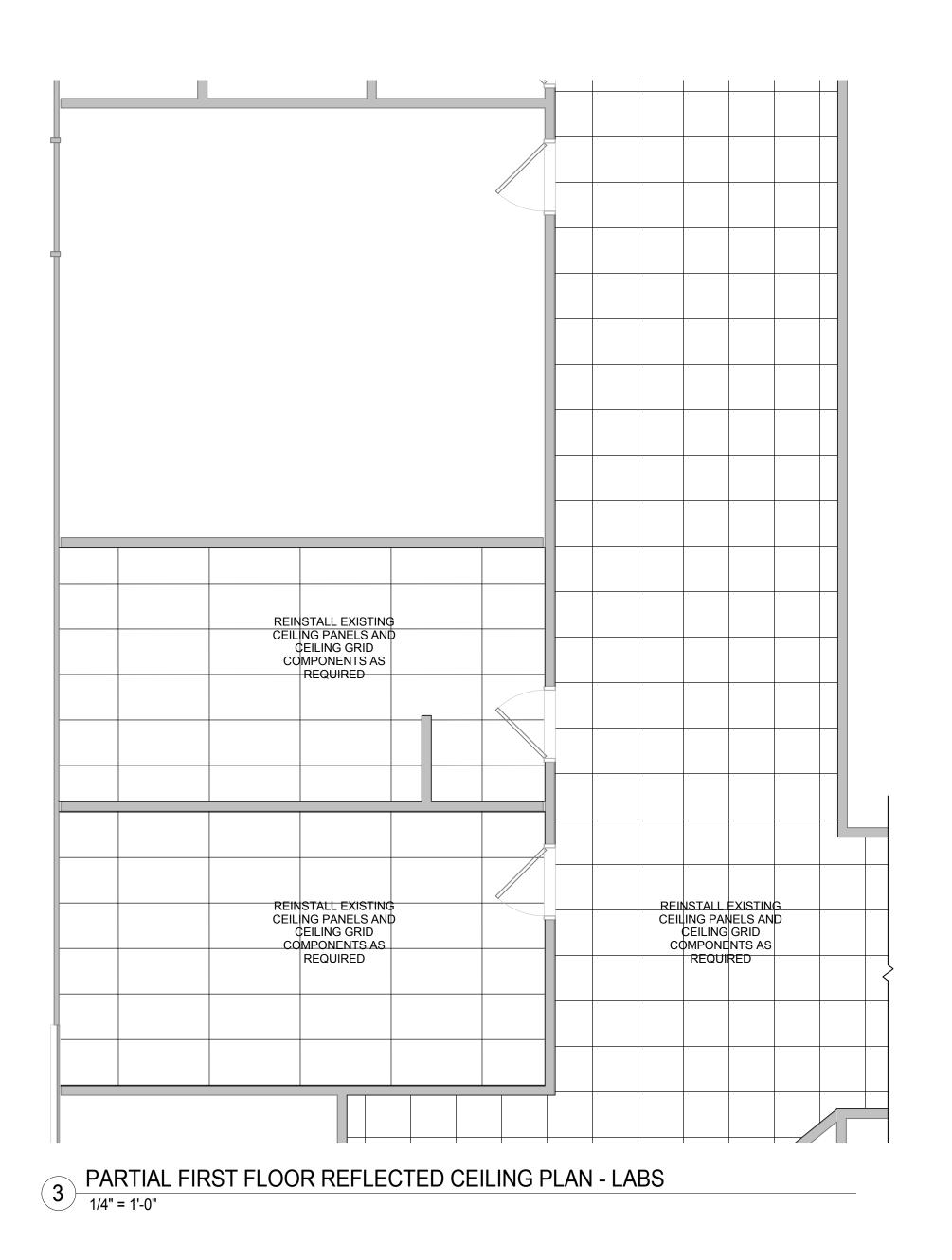
MEP

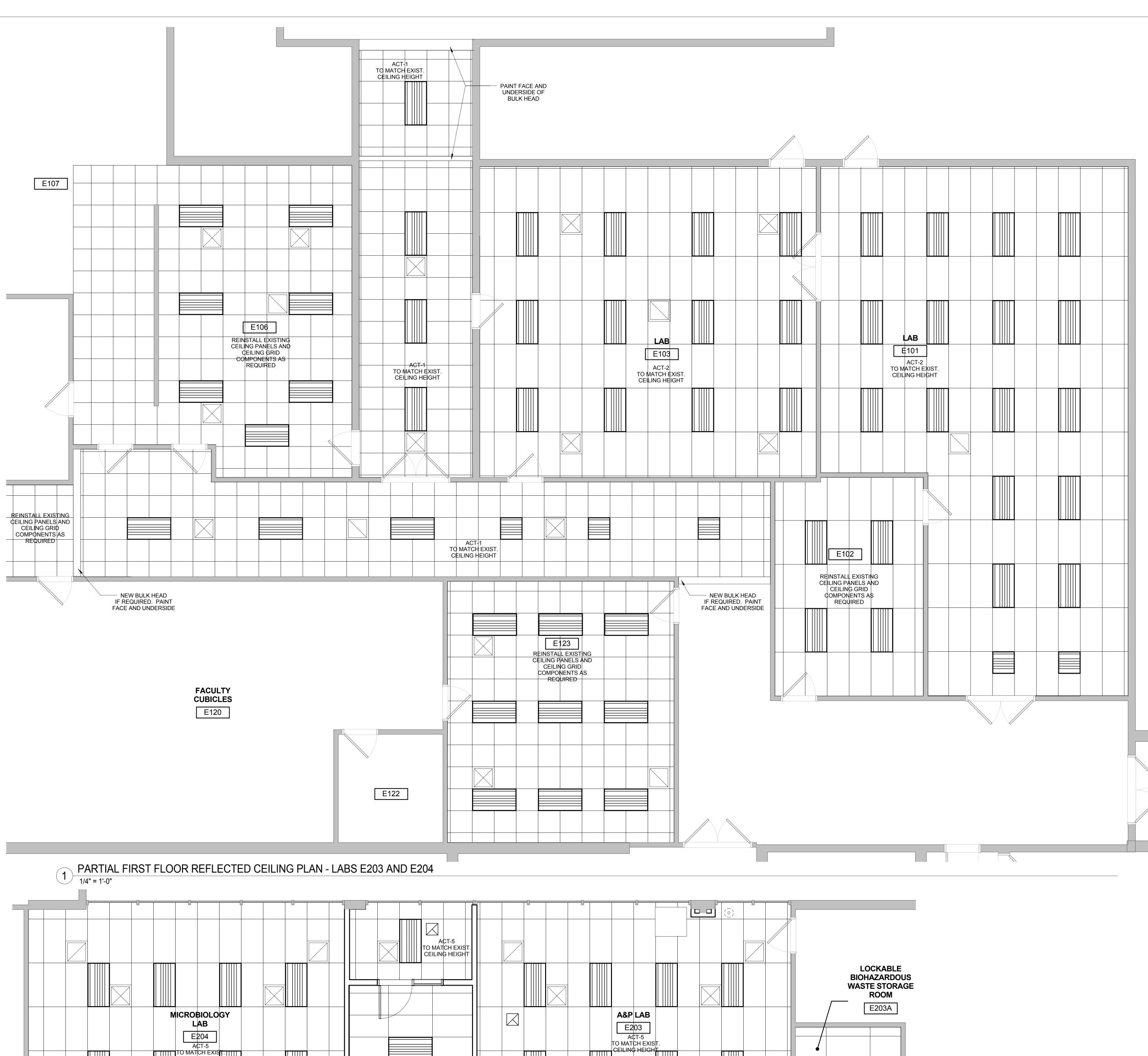
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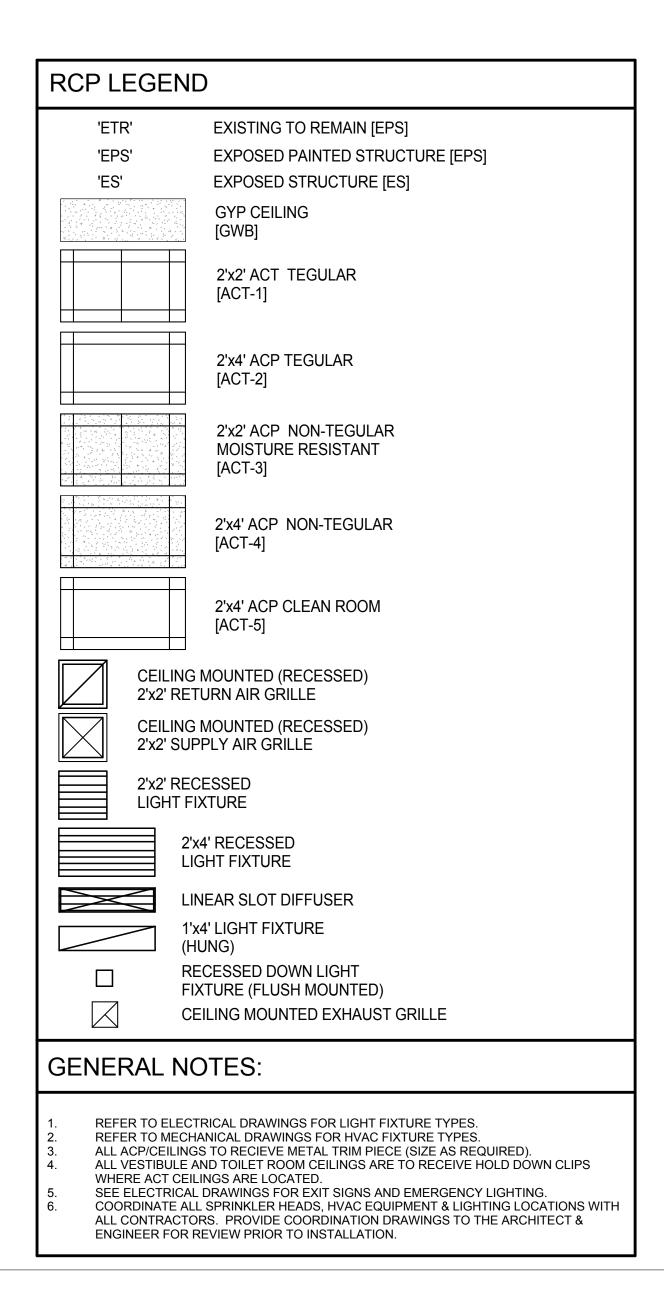
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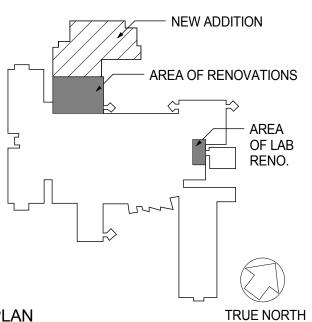








| No.                 | Description                       | Date    |
|---------------------|-----------------------------------|---------|
| $\wedge$            | 100% CDs ISSUED FOR BID           | 6-13-14 |
| 1.                  | ADDM #1 - 100% CDs ISSUED FOR BID | 7-22-14 |
| $\overline{\Delta}$ |                                   |         |
| $\bigtriangleup$    |                                   |         |
| $\square$           |                                   |         |
| $\Delta$            |                                   |         |
| $\Delta$            |                                   |         |
| $\Delta$            |                                   |         |
| $\square$           |                                   |         |
| $\Delta$            |                                   |         |
| $\square$           |                                   |         |
| $\bigtriangleup$    |                                   |         |



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3. PAINT WALLS WITH FLAT FINISH AT CORRIDORS. EGGSHELL FINISH AT CLASSROOMS. EPOXY FINISH AT LAB AREAS. REFER TO SPECIFICATIONS FOR P-7 SPECIALTY PAINT.

2. PAINT FACE AND UNDERSIDE OF SOFFITS P-4.

1. ALL DOOR JAMBS AT RENOVATED AREAS TO BE PAINTED P-2 SEMI GLOSS FINISH UNLESS OTHERWISE NOTED.

GENERAL FINISH NOTES

| TS-1 | RESINOUS TO VINYL TILE:<br>PROVIDE SCHLUTER "SCHIENE"<br>STAINLESS EDGE PROTECTION |
|------|--|
|      | WITH 1/8" MIN. VCT OVERLAP   |

# TRANSITIONS LEGEND

VCT ACCENT TILE VCT-4

VCT ACCENT TILE VCT-2 VCT ACCENT TILE VCT-3

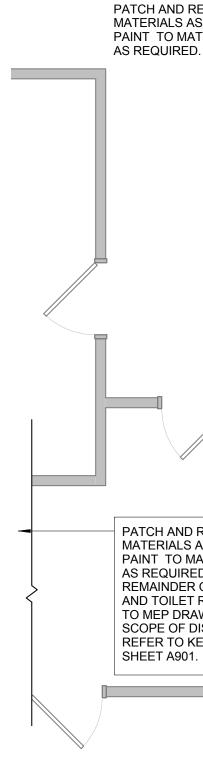
VCT FIELD TILE (VCT-1)

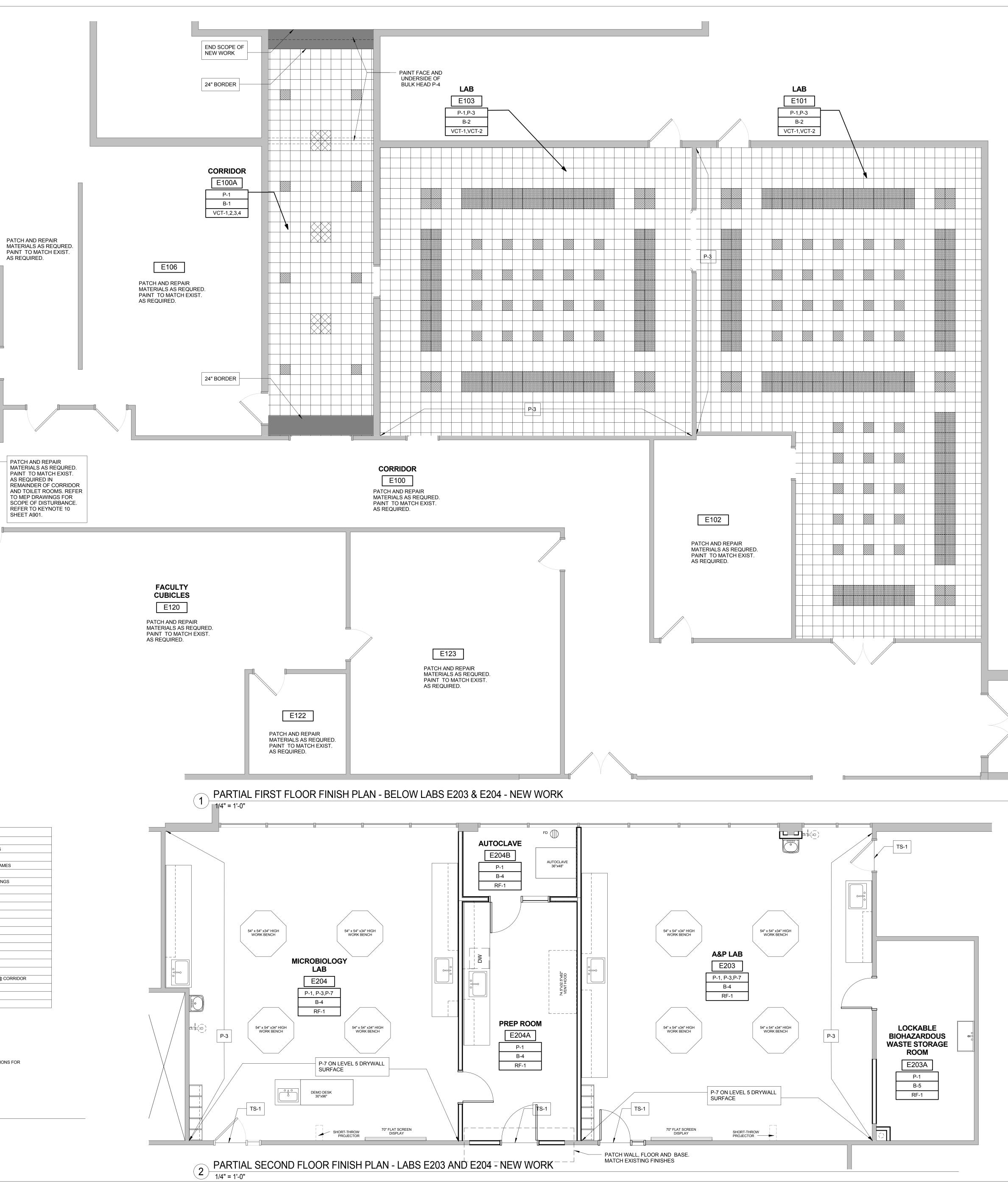
TS - FLOOR TRANSITION FLOOR & WALL PATTERN LEGEND

# LAMINATE 

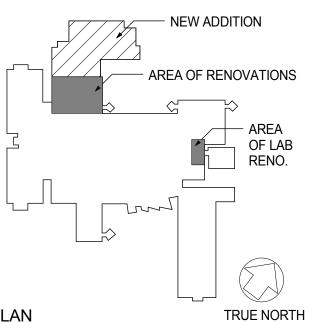
FINISH TAGS XXX ROOM NUMBER XX WALL FINISH XX BASE FINISH XX FLOOR FINISH

|       |                        |                   |                  | DESCRIPTION        |         |                   |
|-------|------------------------|-------------------|------------------|--------------------|---------|-------------------|
| CODE  | MATERIAL               | MANUFACTURER      | SERIES/PATTERN   | COLOR              | DIM.    | REMARKS           |
| P-1   | PAINT                  | SHERWIN WILLIAMS  | SW7043           | WORLDLY GRAY       |         | WALL              |
| P-2   | PAINT                  | SHERWIN WILLIAMS  | SW7046           | ANONYMOUS          |         | DOOR FRAMES       |
| P-3   | PAINT                  | SHERWIN WILLIAMS  | SW7604           | SMOKEY BLUE        |         | ACCENT            |
| P-4   | PAINT                  | SHERWIN WILLIAMS  | SW7007           | CEILING WHITE      |         | D.W. CEILINGS     |
| P-5   | NOT USED               | -                 | -                | -                  |         |                   |
| P-6   | NOT USED               | -                 | -                | -                  |         |                   |
| P-7   | WHITE ERASE<br>COATING | EYKON WHITE ERASE | WRITE ERASE      | WHITE              |         |                   |
| B-1   | RUBBER BASE            | JOHNSONITE        | MILLWORK REVEAL  | 80 FAWN            | 6"      |                   |
| B-2   | RUBBER BASE            | JOHNSONITE        | TRADITIONAL COVE | 80 FAWN            | 4"      |                   |
| B-3   | SEAMLESS BASE          | DUREX COVERINGS   | DYMAFLAKE        | HORIZON            | 6"      |                   |
| B-4   | COVE BASE              | MATCH EXISTING    |                  | MATCH EXISTING     |         |                   |
| RF-1  | RESINOUS FLOOR         | DUREX COVERINGS   | DYMAFLAKE        | HORIZON            |         |                   |
| VCT-1 | VINYL TILE             | MANNINGTON        | PROGRESSIONS     | 55141 COOL WHITE   | 12'X12' | FIELD             |
| VCT-2 | VINYL TILE             | MANNINGTON        | PROGRESSIONS     | 55170 DUCHESS BLUE | 12'X12' | ACCENT            |
| VCT-3 | VINYL TILE             | MANNINGTON        | PROGRESSIONS     | 55129 PUTTY        | 12'X12' | ACCENT            |
| VCT-4 | VINYL TILE             | MANNINGTON        | PROGRESSIONS     | 55519 BED ROCK     | 12'X12' | ACCENT @ CORRIDOR |
|       |                        |                   |                  |                    |         |                   |
|       |                        |                   |                  |                    |         |                   |





| No.                 | Description                       | Date    |
|---------------------|-----------------------------------|---------|
| $\wedge$            | 100% CDs ISSUED FOR BID           | 6-13-14 |
| 1.                  | ADDM #1 - 100% CDs ISSUED FOR BID | 7-22-14 |
| $\overline{\Delta}$ |                                   |         |
| $\bigtriangleup$    |                                   |         |
| $\square$           |                                   |         |
| $\Delta$            |                                   |         |
| $\Delta$            |                                   |         |
| $\Delta$            |                                   |         |
| $\square$           |                                   |         |
| $\Delta$            |                                   |         |
| $\square$           |                                   |         |
| $\bigtriangleup$    |                                   |         |



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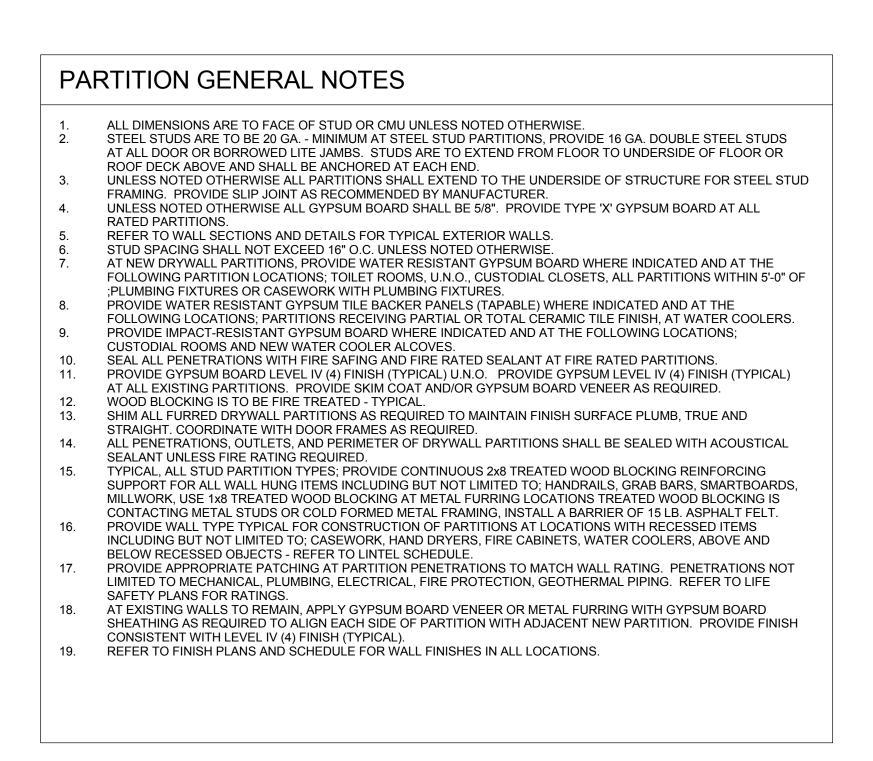
MEP

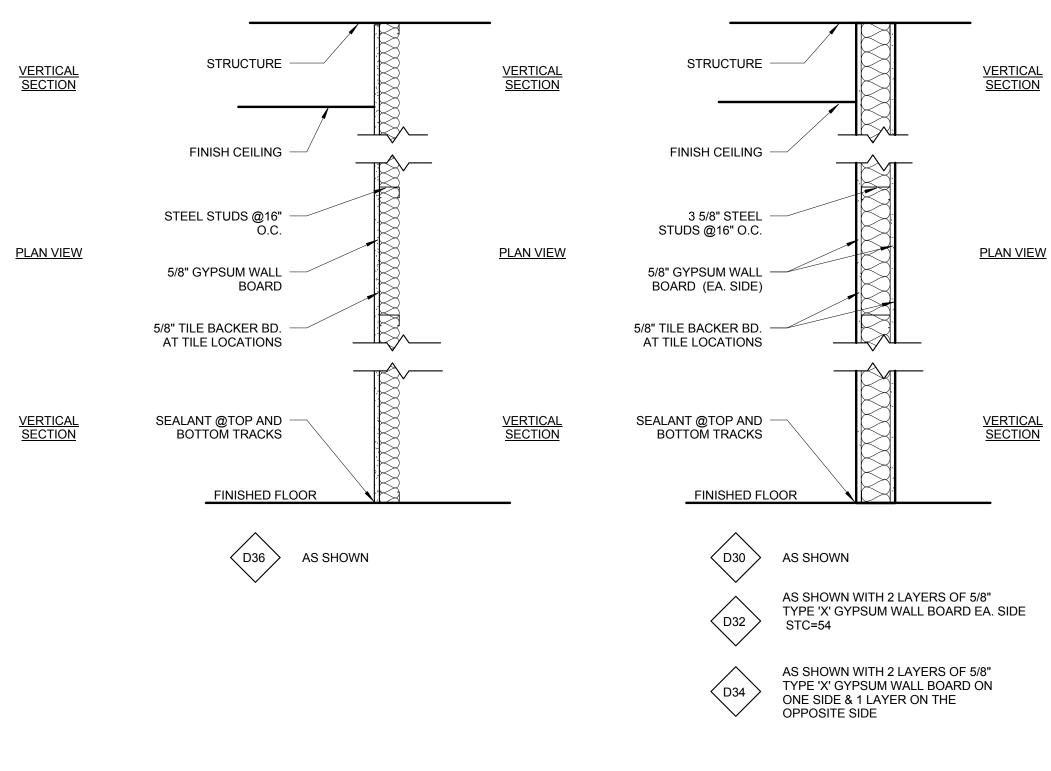
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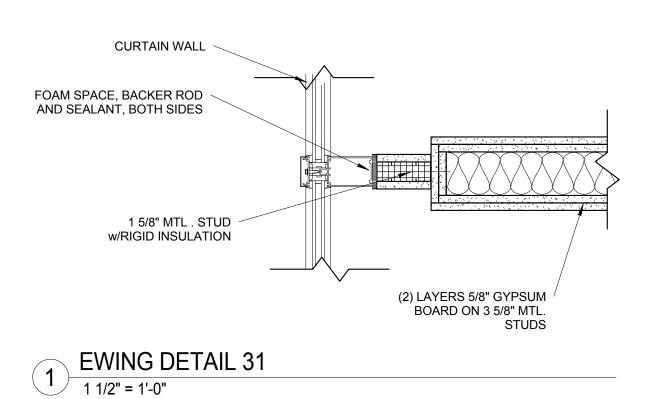










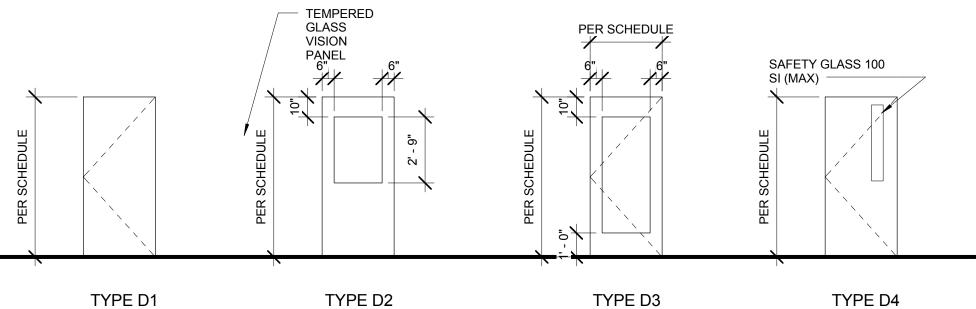


|                |       |                  |      |         |         |             |          | DOOR S | CHEDULE - | E-LABS   |        |           |        |        |             |          |         |
|----------------|-------|------------------|------|---------|---------|-------------|----------|--------|-----------|----------|--------|-----------|--------|--------|-------------|----------|---------|
|                |       |                  |      |         | DC      | DOR         |          |        |           | FRAME    |        |           | Jamb   | Head   |             | Hardware |         |
| Level          | Mark  | Room Name        | Туре | Width   | Height  | Thickness   | Material | Finish | Туре      | Material | Finish | Threshold | Detail | Detail | Fire Rating | Set      | Remarks |
| SECOND FLOOR   | E203A | A&P LAB          | D4   | 3' - 0" | 7' - 0" | 0' - 1 3/4" | WD       | SN     | F1        | HM       | PTD    |           |        |        |             |          |         |
| SECOND FLOOR   | E203B | A&P LAB          | D1   | 3' - 0" | 7' - 0" | 0' - 1 3/4" | WD       | SN     | F5        | HM       | PTD    |           |        |        |             | НО       |         |
| SECOND FLOOR   | E204A | MICROBIOLOGY LAB | D4   | 3' - 0" | 7' - 0" | 0' - 1 3/4" | WD       | SN     | F1        | HM       | PTD    |           |        |        |             | НО       |         |
| SECOND FLOOR   | E204B | AUTOCLAVE        | D2   | 3' - 0" | 7' - 0" | 0' - 1 3/4" | WD       | SN     | F6        | HM       | PTD    |           |        |        |             | НО       |         |
| SECOND FLOOR   | E204C | PREP ROOM        | D1   | 3' - 6" | 7' - 0" | 0' - 1 3/4" | WD       | SN     | F1        | HM       | PTD    |           |        |        |             |          |         |
| SECOND FLOOR   | E204D | MICROBIOLOGY LAB | ETR  | 3' - 0" | 7' - 0" | 0' - 1 3/4" | WD       | SN     | ETR       | HM       | PTD    |           |        |        |             |          |         |
| Grand total: 6 | ·     |                  |      |         |         |             |          |        |           |          |        |           |        |        |             | · .      |         |

# ABBREVIATIONS

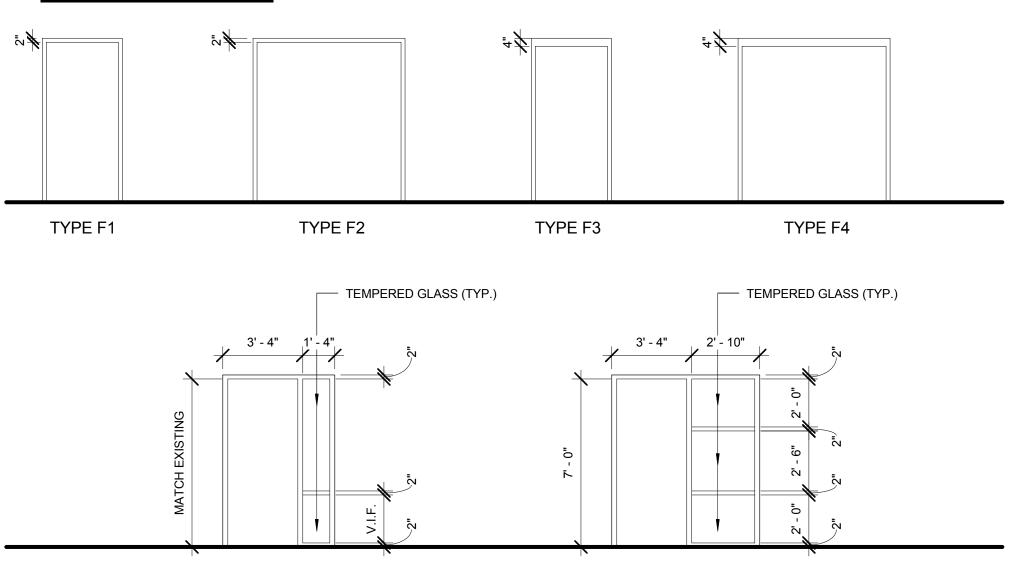
| ALUM | ALUMINUM                |
|------|-------------------------|
| CR   | CARD READER             |
| DE   | DOUBLE EGRESS           |
| EL   | ELECTRIC LOCK           |
| FR   | FRAME                   |
| FF   | FACTORY FINISH          |
| GALV | GALVANIZED              |
| HM   | HOLLOW METAL            |
| KDHM | KNOCK DOWN HOLLOW METAL |
| PTD  | PAINTED                 |
| PF   | PRE-FINISHED            |
| WD   | SOLID CORE - WOOD       |
| SN   | STAINED                 |
| SS   | STAINLESS STEEL         |
| ST   | STEEL                   |
| TD   | THRESHOLD DETAIL        |
| WS   | WRITING SURFACE         |





VISION GLASS DOOR

# **FRAME TYPES**



NOTES:

| 1. | WIDTH  |
|----|--------|
|    | ARE KE |
| 2. | PROVI  |
|    | REQUI  |
| 3. | AT GYF |
| 4. | PROVIE |
| 5. | PROVI  |
| 6. | REFER  |
| 7. | PRIOR  |
|    | SECUR  |
| -  |        |

# **DOOR TYPES**

TYPE F5

TYPE F6

1) PRIME AND PAINT TOPS, EDGE AND BOTTOMS OF ALL HOLIOW METAL DOORS.

2) DEMO, PATCH & REPAIR WALLS AT EXISTING DOOR FRAMES AS REQ'S FOR ELECTRIC LOCK OR CARD READER LOCS. 3) ALL INTERIOR STOREFRONT IS TO RECEIVE 1/4" GLAZING UNLESS NOTED OTHERWISE

4) VERIFY ALL OPENINGS IN FIELD PRIOR TO ORDERING.

5) ALL GLAZING WITHIN 48" OF A DOOR IS TO BE FULLY TEMPERED.

6) ALL VOIDS AT WINDOW JAMBS AND LOUVERS SHALL RECEIVE FOAM INSULATION PRIOR TO APPLICATION OF FINAL INTERIOR CAULK. 7) ALL ROUGH OPENINGS TO RECEIVE CONTINUOUS FLEXIBLE FLASHING OVER SHEATHING PER MANUFACTURER STANDARDS. 8) PROVIDE SEALANT AT BASE & FLOOR FINISH CONNECTION OF ALL AND DOORS AS REQ'D.

9) ALL GLAZING WITHIN 48" OF DOOR SHALL BE FULLY TEMPERED.

# **MISC. DOOR & FRAME NOTES**

HOF HOLLOW METAL FRAMES ARE ACTUAL PARTITION THICKNESS PLUS 1" (SEE PARTITION TYPES ON THIS SHEET). PARTITION TYPES EYED ON FLOOR PLANS U.N.O.

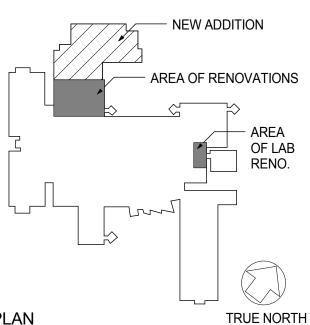
IDE FRAME ANCHORS (LISTED IN SPECS SECTION 08110 - STEEL DOORS AND FRAMES) TO ACCOMODATE PARTITION TYPES AND REMENTS FOR FIRE RATING.

YPSUM BOARD PARTITIONS, SPOT GROUT FRAMES AT EACH JAMB ANCHOR. IDE SEALANT AT JUNCTION OF ALL FRAMES TO PARTITIONS

IDE SEALANT TO ALL DOOR FRAMES AT TRANSITION/INTERESCTION BETWEEN JAMBS AND FLOOR FINISH TO SPECIFICATIONS FOR GLAZING TYPES

TO FRAME INSTALLATION VERIFY HARDWARE WIRING REQ'S AND COORDINATE BETWEEN HARDWARE SPEC, FIRE ALARM, AND RITY DRAWINGS. APPIES TO ALL DOORS WITH ANY ELECTRONIC LOCKING DEVICE. ALL CLASSROOM DOORS ARE TO RECEIVE CLOSERS WITH HOLD OPEN FUNCTIONS WITH EASY RELEASE MECHANISMS

| No.              | Description                       | Date    |
|------------------|-----------------------------------|---------|
| $\square$        |                                   |         |
| <u>_1</u> .      | ADDM #1 - 100% CDs ISSUED FOR BID | 7-22-14 |
| $\bigtriangleup$ |                                   |         |
| $\bigtriangleup$ |                                   |         |
| $\square$        |                                   |         |
| $\bigtriangleup$ |                                   |         |
| $\square$        |                                   |         |
| $\square$        |                                   |         |
| $\Delta$         |                                   |         |
| $\bigtriangleup$ |                                   |         |
| $\square$        |                                   |         |
| $\bigtriangleup$ |                                   |         |
| $\square$        |                                   |         |
| $\square$        |                                   |         |



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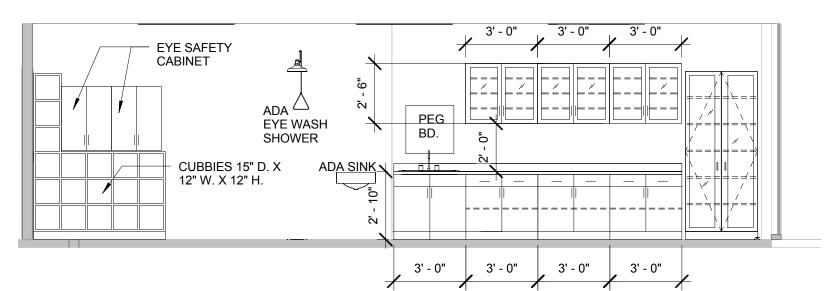
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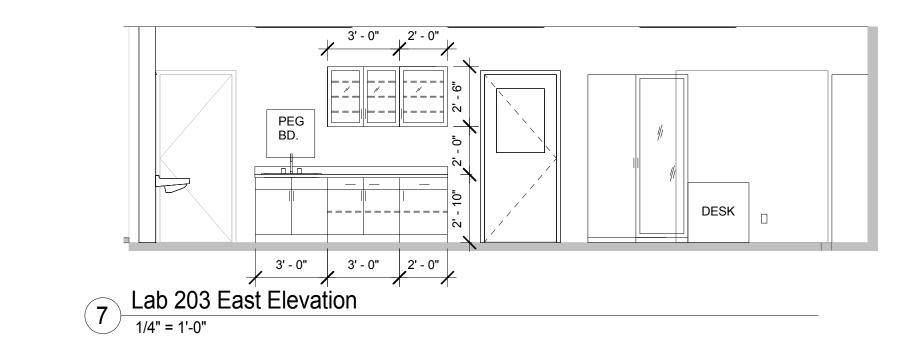
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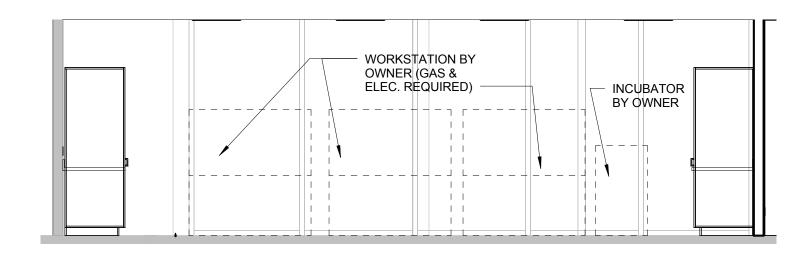




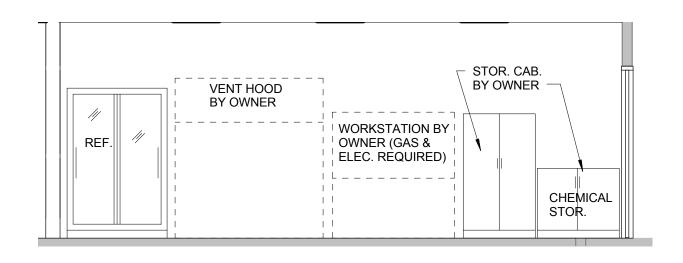


6 Lab 204 West Elevation

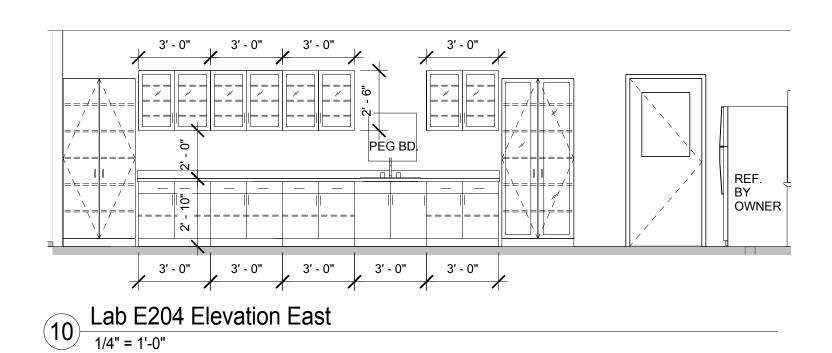


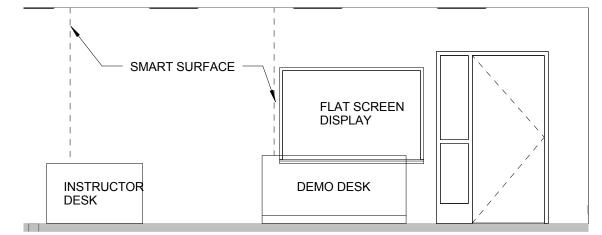


8 Lab 204 North Elevation 1/4" = 1'-0"

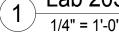


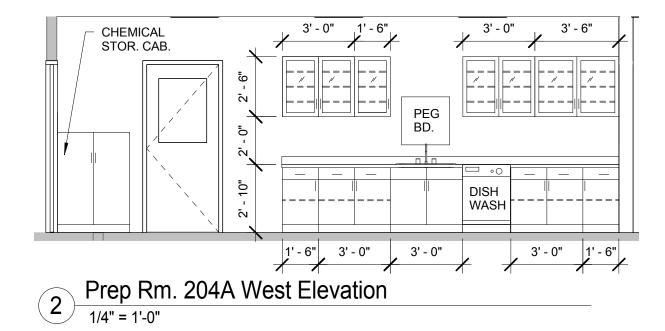
9 Prep Rm. 204A East Elevation 1/4" = 1'-0"

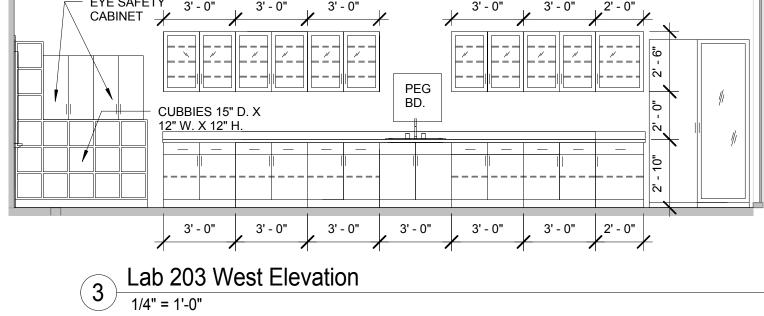




1 Lab 203 South Elevation 1/4" = 1'-0"



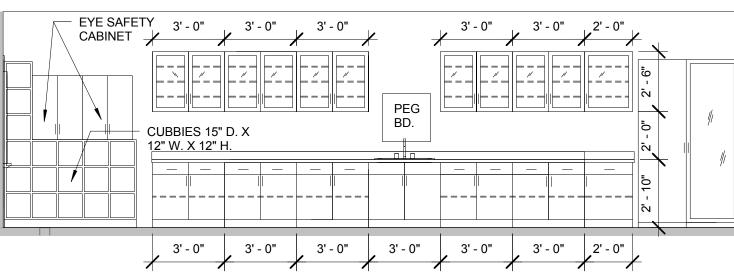


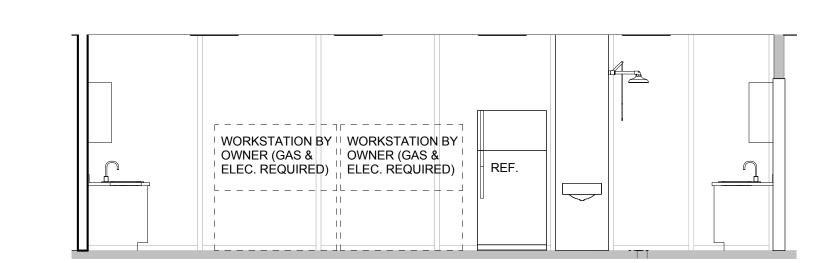


\_\_\_\_\_

- SMART SURFACE

**E** 



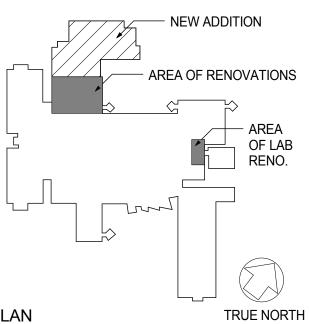


5 Lab 203 North Elevation

FLAT SCREEN DISPLAY

4 Lab 204 South Elevation 1/4" = 1'-0"

| No.                 | Description                       | Date    |
|---------------------|-----------------------------------|---------|
| $\wedge$            | 100% CDs ISSUED FOR BID           | 6-13-14 |
| 1.                  | ADDM #1 - 100% CDs ISSUED FOR BID | 7-22-14 |
| $\overline{\Delta}$ |                                   |         |
| $\bigtriangleup$    |                                   |         |
| $\square$           |                                   |         |
| $\Delta$            |                                   |         |
| $\Delta$            |                                   |         |
| $\Delta$            |                                   |         |
| $\square$           |                                   |         |
| $\Delta$            |                                   |         |
| $\square$           |                                   |         |
| $\bigtriangleup$    |                                   |         |



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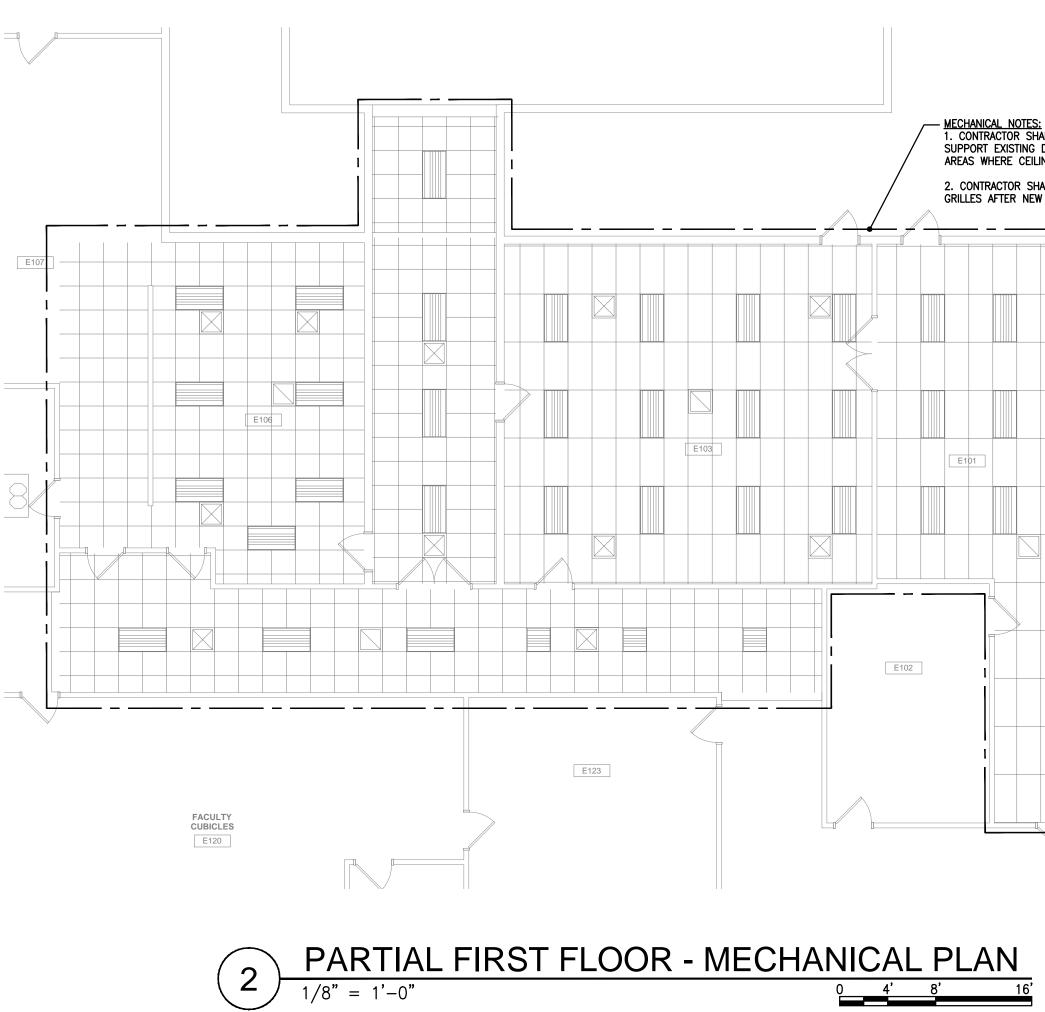
MEP

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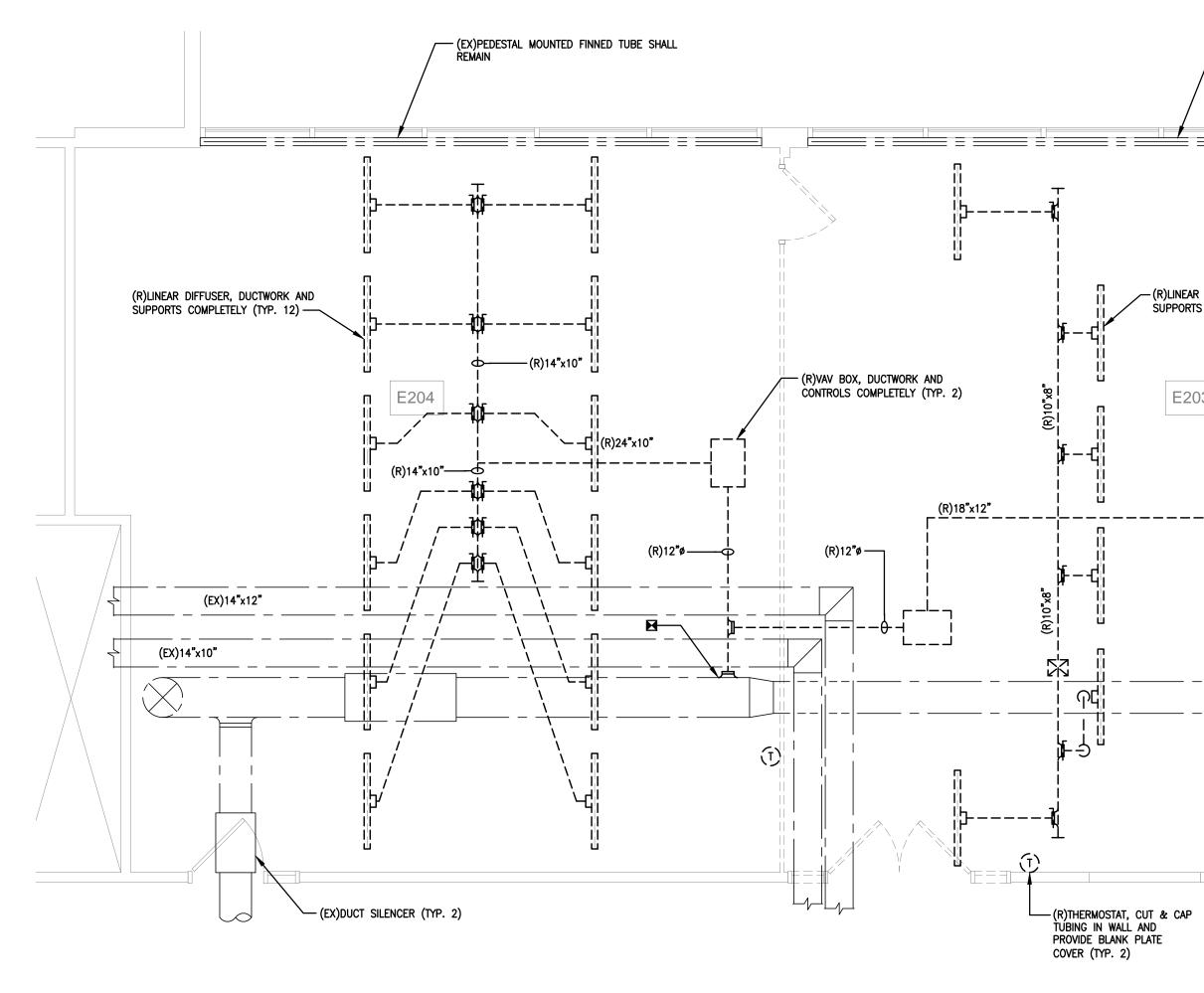




# MECHANICAL LEGEND

|   | 1. CO<br>SUPF<br>AREA | IANICAL NOTES:<br>DNTRACTOR SHA<br>PORT EXISTING I<br>S WHERE CEILIN<br>DNTRACTOR SHA | DIFFUSERS &<br>NGS ARE BEIN | GRILLES IN ALI<br>G REMOVED. | -   |
|---|-----------------------|---|-----------------------------|------------------------------|-----|
|   |                       | ES AFTER NEW  | CEILINGS ARE                | INSTALLED.                   | 5 œ |
|   |                       |   |                             |                              |     |
|   |                       |   |                             |                              |     |
|   |                       |   |                             |                              |     |
|   |                       |   |                             |                              |     |
|   | E1                    | 01  |                             |                              |     |
|   |                       |   |                             |                              |     |
|   |                       |   |                             |                              |     |
|   |                       |   |                             |                              |     |
| E | 102                   |   |                             |                              |     |
|   |                       |   |                             |                              |     |
|   |                       |   |                             |                              |     |
|   |                       |   |                             |                              |     |

|            | POINT OF DEMOLITION BETWEEN DEMO WORK<br>& EXISTING WORK TO REMAIN, PATCH & | CAV  | CONSTANT AIR VOLUME           |
|------------|---|------|-------------------------------|
|            | INSULATE DUCTWORK TO MATCH EXISTING<br>CONDITIONS.                          | CD   | CEILING DIFFUSER              |
|            |   | CR   | CEILING RETURN/EXHAUST GRILLE |
| •          | POINT OF CONNECTION BETWEEN NEW WORK<br>& EXISTING WORK TO REMAIN           | CWR  | CHILLED WATER RETURN PIPING   |
| Ţ          | THERMOSTAT  | CWS  | CHILLED WATER SUPPLY PIPING   |
| <b>_</b> . | VOLUME DAMPER   | (EX) | EXISTING WORK SHALL REMAIN    |
| Ą          | CONICAL COLLAR  | HWR  | HOT WATER RETURN PIPING       |
| <b>7</b>   | CONICAL COLLAR W/VD   | HWS  | HOT WATER SUPPLY PIPING       |
| 図          | CEILING DIFFUSER  | (R)  | EXISTING WORK TO BE REMOVED   |
|            | CEILING RETURN/EXHAUST GRILLE   | RTU  | ROOFTOP UNIT                  |
| •          | MOTOR OPERATED DAMPER   | VAV  | VARIABLE AIR VOLUME           |
| ÷          | SHUT OFF VALVE  |      |                               |
| $\otimes$  | BALANCING VALVE   |      |                               |
|            | EXISTING WORK/EQUIPMENT TO BE REMOVED                                       |      |                               |
|            | EXISTING WORK/EQUIPMENT TO REMAIN   |      |                               |
|            | NEW WORK/EQUIPMENT  |      |                               |



SECOND FLOOR - MECHANICAL DEMOLITION PLAN 1/4" = 1'-0"0 2' 4' 8

# GENERAL NOTES

- MECHANICAL CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, FEES AND PERMITS FOR A COMPLETE INSTALLATION. ALL WORK SHALL COMPLY WITH APPLICABLE CODES AND STANDARDS. 1.
- 2. ALL COMPONENTS REQUIRED FOR A COMPLETE INSTALLATION ARE NOT SHOWN ON THE DRAWINGS. REFER TO EQUIPMENT INSTALLATION INSTRUCTIONS FOR ADDITIONAL REQUIREMENTS, INCLUDING REQUIRED CONNECTION LOCATIONS, TYPES, & SIZES.
- 3. UNLESS SPECIFICALLY DIMENSIONED, THE WORK SHOWN ON THE DRAWINGS IS DIAGRAMMATIC ONLY TO SHOW GENERAL ARRANGEMENTS. THE DRAWINGS ARE NOT TO BE SCALED. PIPE AND DUCT ROUTING AND EQUIPMENT CONNECTION LOCATIONS SHOWN ON DRAWINGS ARE APPROXIMATE. FIELD VERIFY CLEARANCES, DIMENSIONS, MATERIALS, AND EQUIPMENT REQUIREMENTS PRIOR TO CONSTRUCTION. RELOCATE CONDUITS, PIPING HANGERS, ETC. AS REQUIRED.
- 4. IT IS THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR TO PERFORM ALL WORK NECESSARY TO PREPARE STRUCTURES FOR THE INSTALLATION OF MECHANICAL SYSTEMS. ALL HOLES, OPENINGS, AND DAMAGED MATERIALS CREATED DURING CONSTRUCTION SHALL BE PATCHED AND FINISHED.
- 5. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL CUTTING, PATCHING, FINISHING, AND PENETRATIONS REQUIRED BY THE INSTALLATIONS. ALL PENETRATIONS SHALL BE PATCHED AND SEALED. CUTTING OF BUILDING CONSTRUCTION MATERIALS SHALL CONFORM TO THE CHARACTERISTICS OF THE PARTICULAR MATERIAL INVOLVED AND SHALL NOT CREATE ANY STRUCTURAL WEAKNESS OR UNSIGHTLY APPEARANCE. ALL CUTTING SHALL MEET THE APPROVAL OF THE ARCHITECT AND/OR OWNER'S REPRESENTATIVE: COORDINATE WITH THIS PARTY BEFORE COMMENCING.
- WHENEVER CONNECTIONS TO EXISTING FACILITIES ARE REQUIRED, 6. THE MECHANICAL CONTRACTOR SHALL COORDINATE WITH THE OWNER'S REPRESENTATIVE AND SCHEDULE THE WORK TO MINIMIZE INTERRUPTION OF SERVICE AND AVOID INTERFERENCE WITH NORMAL FUNCTION OF THE BUILDING AND/OR SURROUNDING WORK AREA. RELOCATED ITEMS SHALL BE INSTALLED IN COMPLIANCE WITH APPLICABLE CODES AND REGULATIONS.
- 7. ALL WORK, EQUIPMENT AND MATERIALS SHALL BE PROTECTED AT ALL TIMES. ALL DUCT AND PIPE OPENINGS SHALL BE PROPERLY CAPPED OR PLUGGED DURING INSTALLATION.
- 8. WHERE REQUIRED FOR CLEARANCE, TO AVOID INTERFERENCE OR EQUIPMENT CONNECTIONS, THE MECHANICAL CONTRACTOR SHALL OFFSET PIPES, DUCTS OR CONDUITS. NECESSARY SPECIAL FITTINGS OR ADAPTERS SHALL BE PROVIDED TO MAINTAIN GOOD FLOW CHARACTERISTICS. PROPERLY DRAIN AND DRIP WHERE NECESSARY.
- 9. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF HIS OWN PEOPLE. COMPLY WITH ALL OWNER'S SITE SAFETY CONDITIONS.
- 10. MECHANICAL CONTRACTOR SHALL MOUNT ALL THERMOSTATS AND ADJUSTABLE SENSORS IN FINISHED OCCUPIED ROOMS AT ADA HEIGHT OF 48 INCHES.
- 11. ALL VALVES SHALL HAVE EXTENDED STEMS TO PLACE THE HANDLE OUTSIDE OF PIPE INSULATION. 12. FOR ANY MATERIALS AND EQUIPMENT REMOVED DURING THE DEMOLITION PHASE OF THE PROJECT, THE OWNER'S

REPRESENTATIVE SHALL APPROVE FINAL DISPOSITION OF ALL SUCH

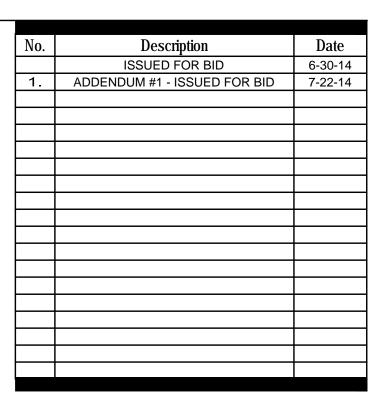
MATERIAL FOR RETENTION AND STORAGE, OR REMOVAL FROM THE

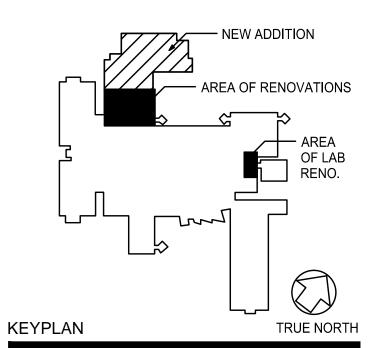
SITE BY THE CONTRACTOR.

---- (EX)PEDESTAL MOUNTED FINNED TUBE SHALL REMAIN (TYP. 2) -----\_\_\_\_**\*\*\*** - (R)LINEAR DIFFUSER, DUCTWORK AND `\_\_\_\_\_ SUPPORTS COMPLETELY (TYP. 14) E203 (R)LINEAR DIFFUSER, DUCTWORK AND SUPPORTS ш\_\_\_\_\_(R)18<sup>\*</sup>х10<sup>\*\*</sup>\_\_\_\_\_ COMPLETELY (TYP. 2) -E203A ;;]-----;+----4∭  $\neg$ 

lh-----

(EX)VAV BOX (TYP.)





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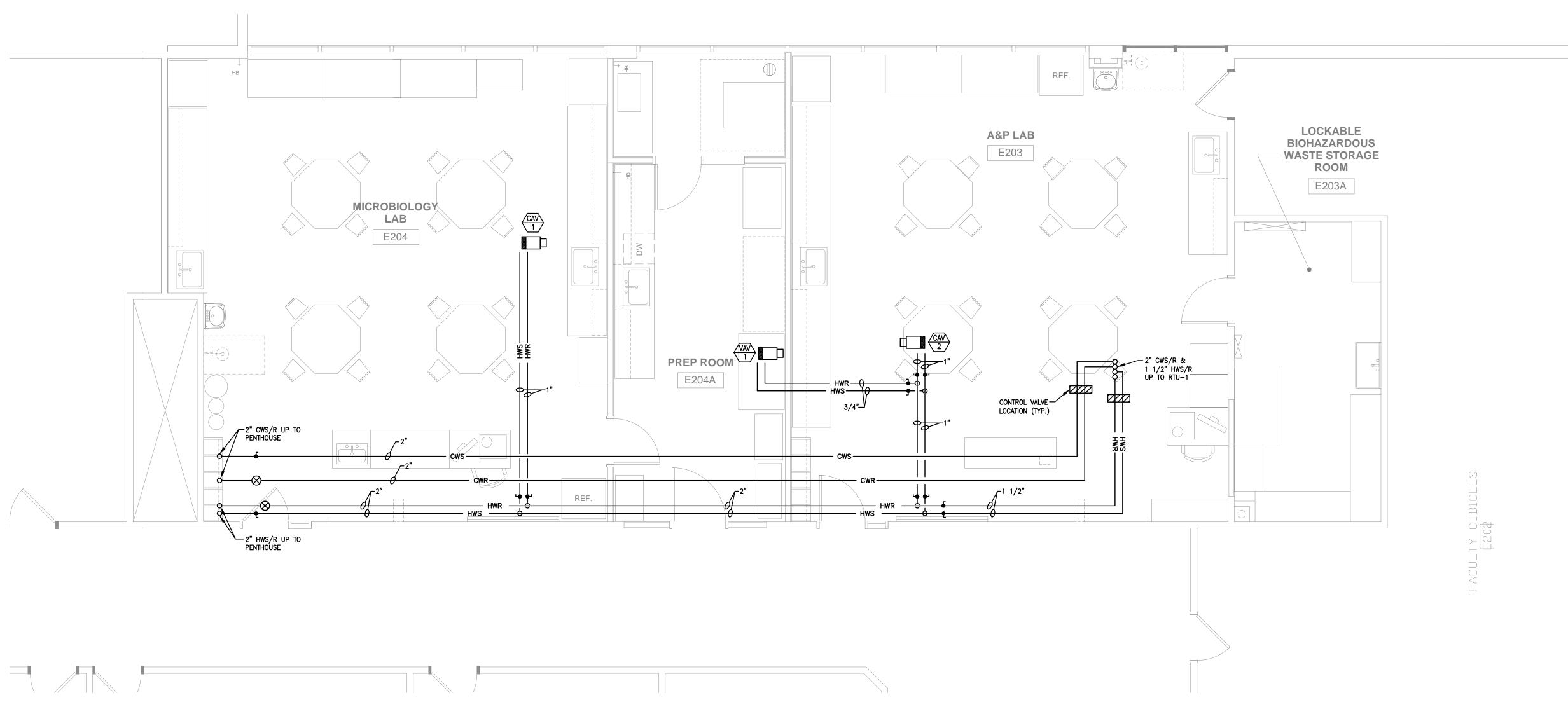
> MEP Furlow Associates 1206 Society Drive

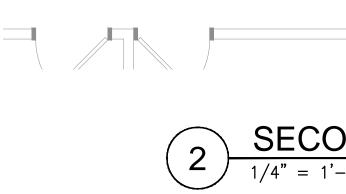
Claymont, DE 19703 302.798.3515

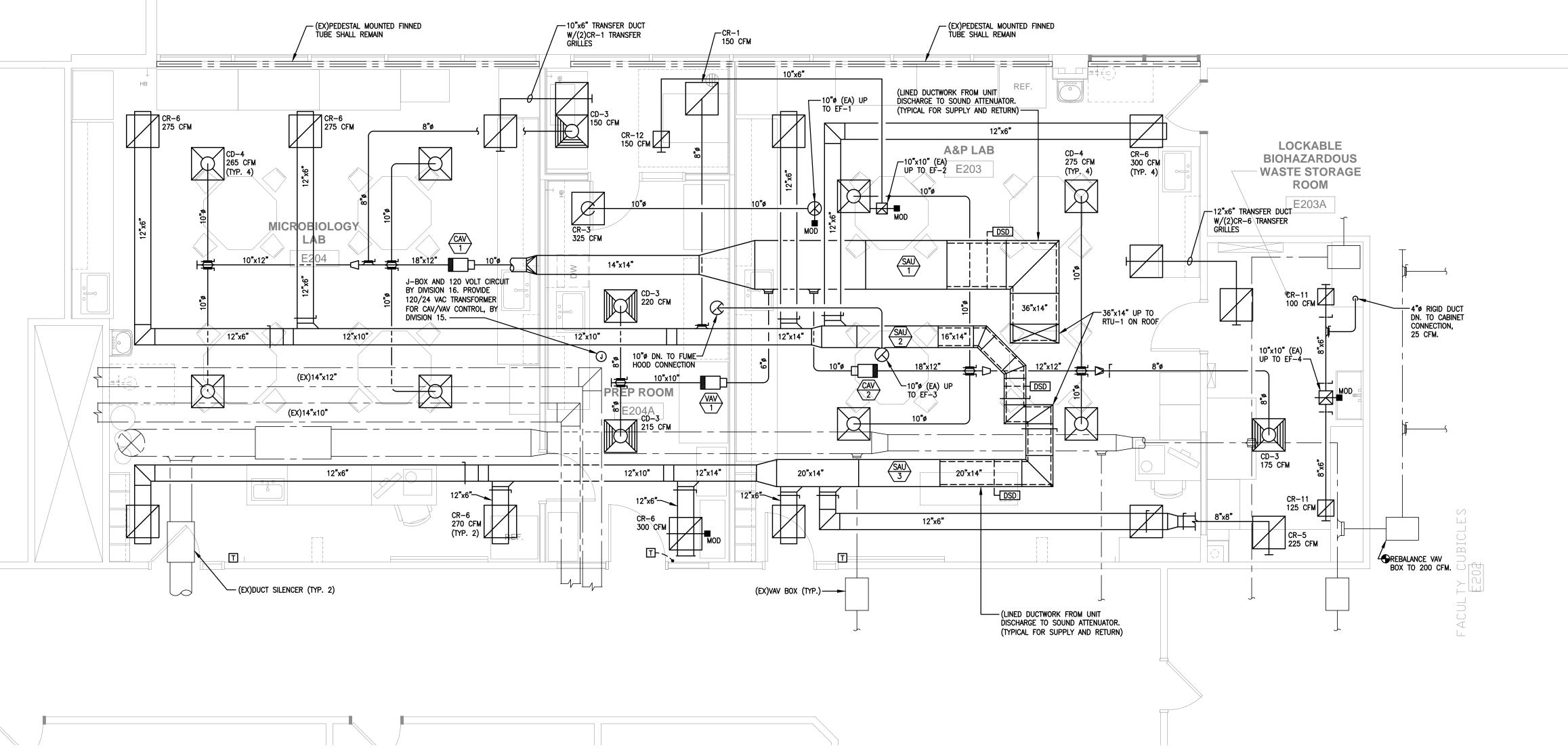
Structural Engineer MacIntosh Engineering 300 Delaware Avenue, Suite 820 Wilmington, DE 19801 302.252.9200

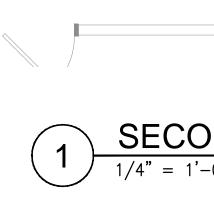








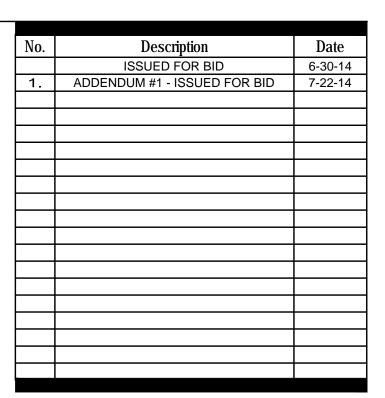


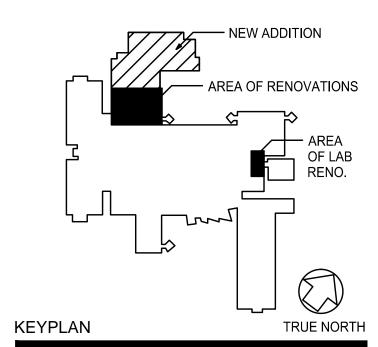






SECOND FLOOR - MECHANICAL PLAN 1/4" = 1'-0"





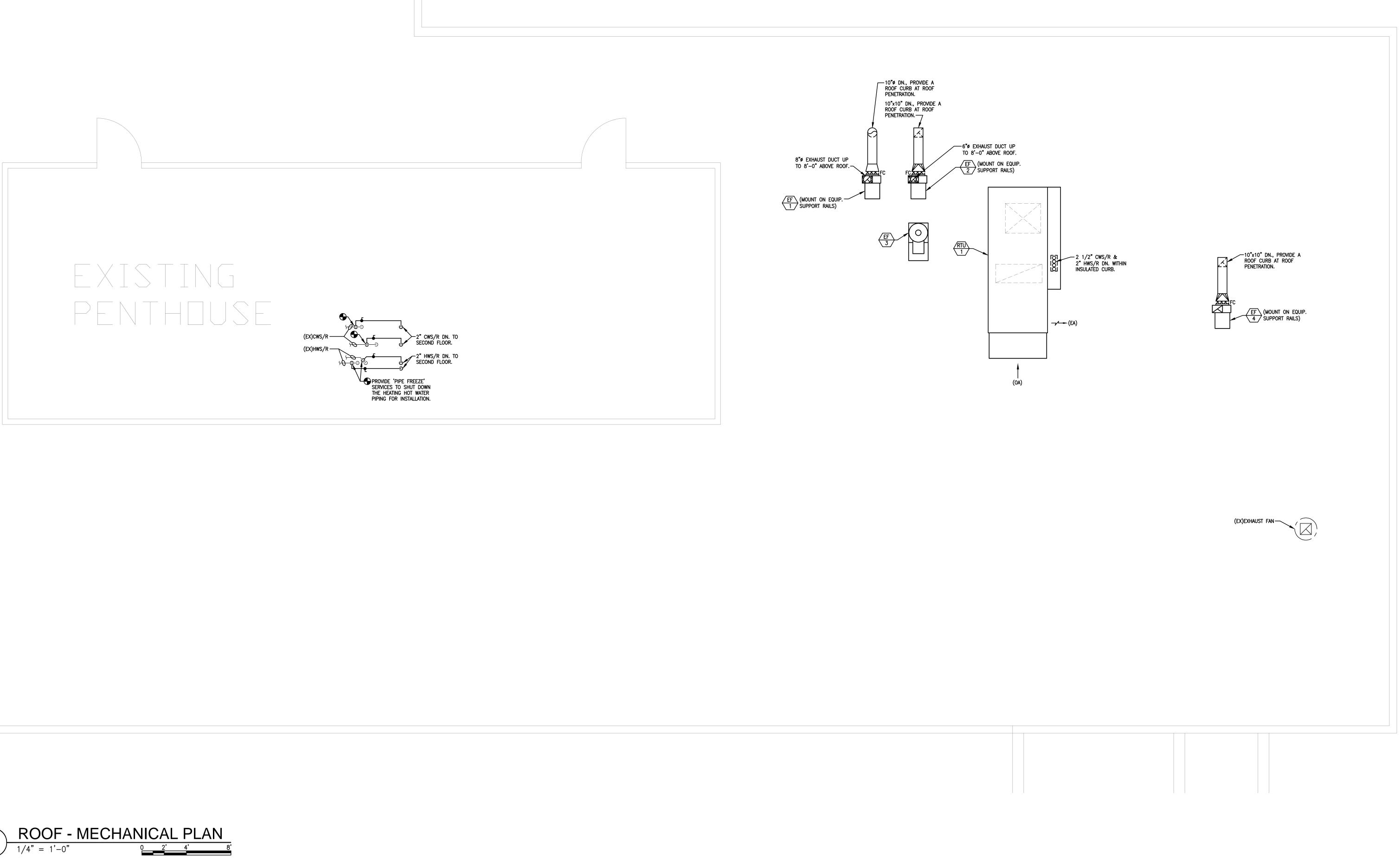
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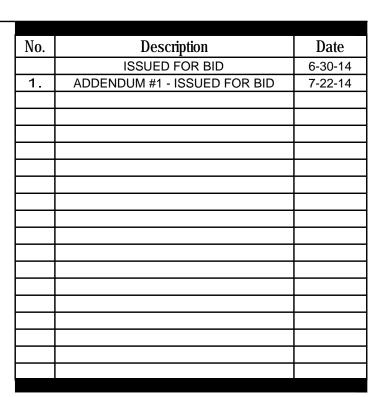
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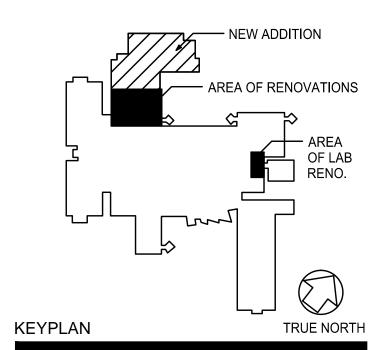












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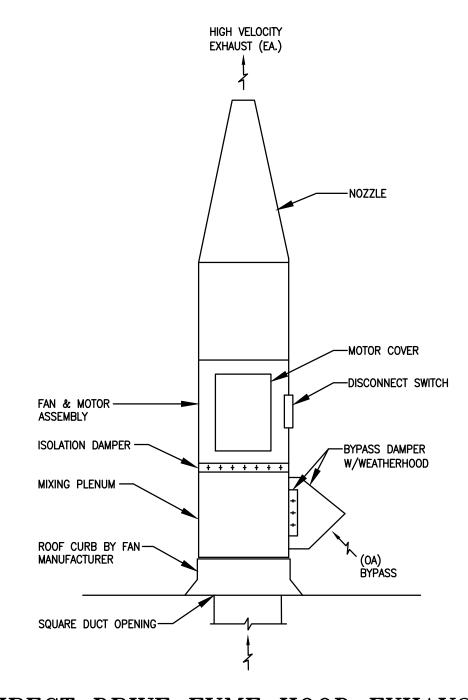


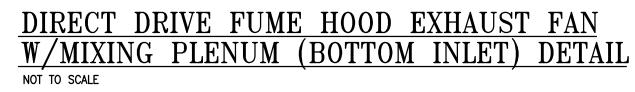


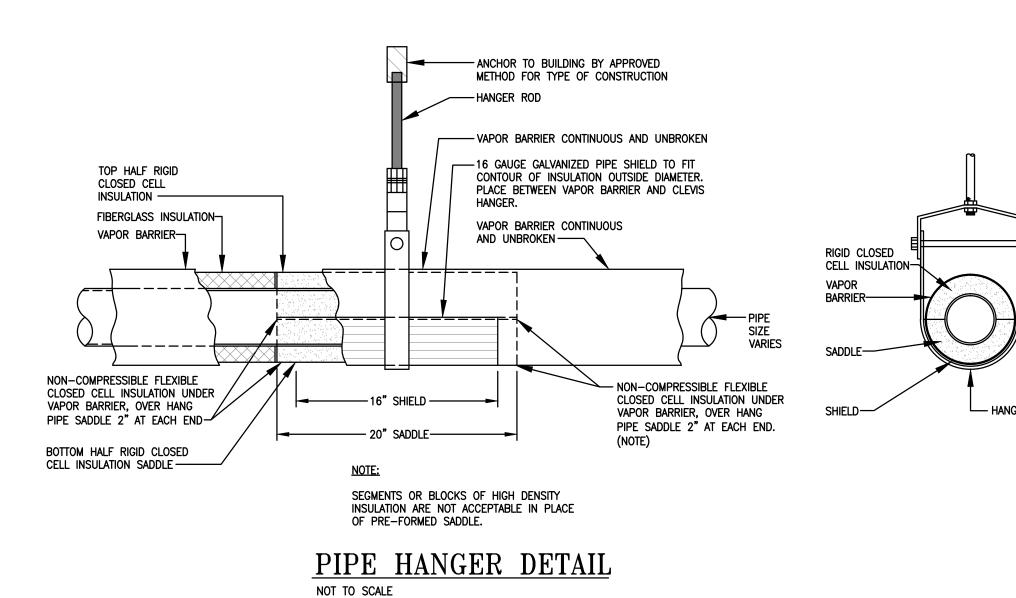
|                | ELECTRICAL DATA                 |       |                   |                    | SUPPLY   | NR       |    |                 |          |                |           |               |         | EXHAUST A          | R    |           |              |        |       |      |          | CC       | OOLING COI | NL                  |          |              |             |         |      | F    | HOT WATER | R COIL MODU | ILE                 |              |          |              |        | 1     |
|----------------|---------------------------------|-------|-------------------|--------------------|----------|----------|----|-----------------|----------|----------------|-----------|---------------|---------|--------------------|------|-----------|--------------|--------|-------|------|----------|----------|------------|---------------------|----------|--------------|-------------|---------|------|------|-----------|-------------|---------------------|--------------|----------|--------------|--------|-------|
| EQUIPMENT MODE | HALL FACTORY FACTORY SUPPLY     |       |                   | ESP TSP            | EAT (°F) | LAT (°F) |    | FAN MOTOR       | FAN      | EXHAUST        | ESP       | TSP           | EAT (*F | <sup>;</sup> ) LAT | (°F) | FAN       | N MOTOR      | FAN    | TOTAL | SENS | EAT (°F) | LAT (°F) | .)<br>Ewi  | л смт               |          | APD          | WPD         | TOTAL   | EAT  | LAT  | EWT L     | WT          |                     | APD          | WPD      | MAKE & MODEL | WEIGHT | NOTES |
|                | MCA STARTER DISCONNECT SPP EFF, | %     | CFM OA CFM        | (IN. W.C.) (IN. W. | ) Db Wb  | Db Wb    | HP | EFFICIENCY VOLT | PHASE    | EXHAUST<br>CFM | (IN. W.C. | .) (IN. W.C.) | Db      | Wb Db              | Wb I | HP EFFICI | IENCY VOLT/P | HASE   |       | MBH  | Db Wt    | b Db N   | Wb (°F)    | <sup>-</sup> ) (°F) | MEDIA GI | PM   (IN. W. | C.) (FT. HD | D.) MBH | (°F) | (°F) | (°F) (°   | F) MEDIA    | <sup>GPM</sup>   (I | IN. W.C.) (F | FT. HD.) |              | (100)  |       |
| SUMMER         |                                 | . 2,6 | 685 MIN. 2,685 MI | N. 10 2.22         | 95 78    | 82 69    |    |                 | 8/3 1170 | 2,890 MAX.     | 0.75      | 1.46          | 75      | 63 91              | 74   | 2 00      | FM 208       | 3 1760 | 276   | 110  | 82 60    | 55       | 54 45      | 5 55                | WTP 2    |              | 5 16        | 221     | 0    | 60   | 160 1     | 42 WTP      | 27                  | 0.02         | 0.5      | AAON MODEL   | 2 860  |       |
| WINTER         |                                 | 2,9   | 920 MAX. 2,920 MA | X. 1.0 2.22        | 0 -2     | 47 39    |    | PREM. 20        | 5/5 11/0 | 2,565 MIN.     | 0.75      | 1.40          | 70      | 53 16              | 16   |           | EM. 2007     |        | 230   | 119  | 02 08    | 9 00 0   | 54 45      | 5 55                |          | 20 0.00      | 5.16        | 221     | 0    | 60   |           | 42 WIR.     | 23                  | 0.02         | 0.5      | 'RN-016-8'   | 2,000  |       |

NOTES: 1. UNIT SHALL BE PROVIDED WITH A SUPPLY FAN VFD, EXHAUST FAN VFD, ROTATION SENSOR AND ROOF CURB WITH PIPING ENCLOSURE.

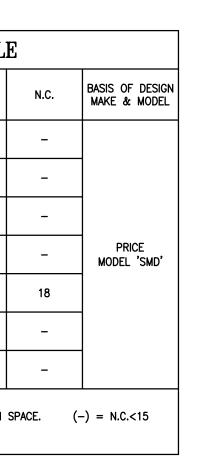
| CD PLAN<br>N SYMBOL | -  | CEILIN                   | G DIFFU                 | USER S          | CHEDUL          |
|---------------------|--|--------------------------|-------------------------|-----------------|-----------------|
| SYMBOL              | MODULE<br>SIZE<br>(IN.)                          | NOMINAL<br>SIZE<br>(IN.) | NECK<br>SIZE<br>(IN. Ø) | CFM<br>RANGE    | SP<br>(IN. WC.) |
| CD-1                |  | 6x6                      | 6                       | 0-100           | 0.05            |
| CD-2                |  | 9x9                      | 6                       | 101-140         | 0.03            |
| CD-3                |  | 9x9                      | 8                       | 141-225         | 0.05            |
| CD-4                | 24x24  | 12x12                    | 10                      | 226-330         | 0.04            |
| CD-5                |  | 12x12                    | 12                      | 331-400         | 0.05            |
| CD-6                |  | 15x15                    | 14                      | 401-550         | 0.04            |
| CD-7                |  | 18x18                    | 16                      | 551-700         | 0.03            |
| 2. NOT ALL S        | OR SHALL COOR<br>IZES MAY BE U<br>CH APPLICATION | ISED; VERIFY TY          | PES AND QUAN            | TITIES WITH PLA |                 |







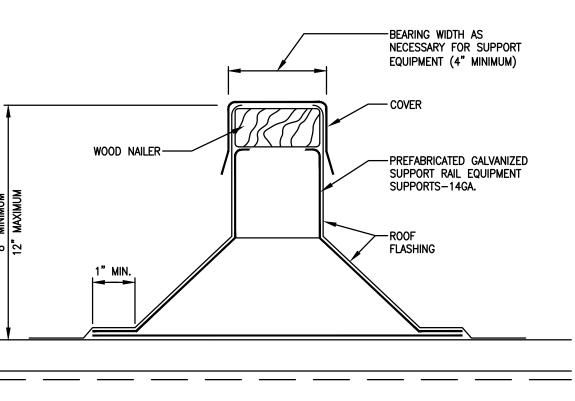
ROOFTOP UNIT W/ENERGY RECOVERY SCHEDULE



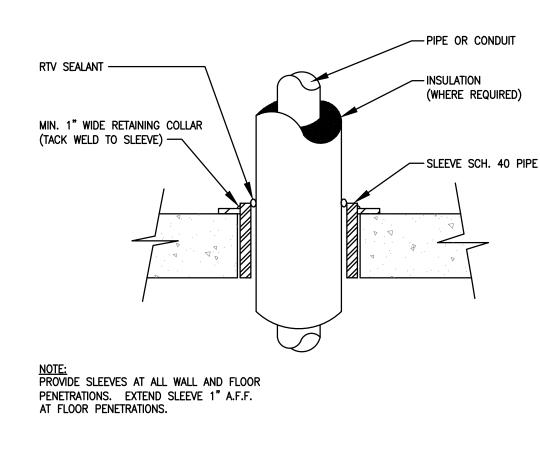
| CR PLAN<br>N SYMBO | ol CE                   | ILING                    | RETURI                  | N GRILL      | E SCHE          | DULE |                                 |
|--------------------|-------------------------|--------------------------|-------------------------|--------------|-----------------|------|---------------------------------|
| SYMBOL             | MODULE<br>SIZE<br>(IN.) | NOMINAL<br>SIZE<br>(IN.) | NECK<br>SIZE<br>(IN. Ø) | CFM<br>RANGE | SP<br>(IN. WC.) | N.C. | BASIS OF DESIGN<br>MAKE & MODEL |
| CR-1               |                         | -                        | 8                       | 0–175        | 0.04            | -    |                                 |
| CR-2               |                         | _                        | 10                      | 176–280      | 0.04            | -    |                                 |
| CR-3               |                         | _                        | 12                      | 281-400      | 0.03            | -    |                                 |
| CR-4               |                         | -                        | 14                      | 401-550      | 0.05            | -    |                                 |
| CR-5               | 04-04                   | 8x8                      | -                       | 176–240      | 0.05            | -    |                                 |
| CR-6               | 24x24                   | 10x10                    | -                       | 241-325      | 0.04            | -    | PRICE                           |
| CR-7               |                         | 12x12                    | -                       | 326-420      | 0.03            | -    | MODEL 'PDDR'                    |
| CR-8               |                         | 14x14                    | -                       | 421-500      | 0.03            | -    |                                 |
| CR-9               |                         | 15x15                    | -                       | 501-625      | 0.03            | -    |                                 |
| CR-10              |                         | 22x22                    | -                       | 626-1300     | 0.03            | -    |                                 |
| CR-11              | 10.10                   | 6x6                      | -                       | 0-125        | 0.07            | -    |                                 |
| CR-12              | 12x12                   | 10x10                    | -                       | 126–270      | 0.03            | _    |                                 |

|                     |                    |                                    | EL         | ECTRICAL DAT                                    | A — FAN MOTO | R   |        |      | ESP       |     |                                    |       |       |  |
|---------------------|--------------------|------------------------------------|------------|---|--------------|-----|--------|------|-----------|-----|------------------------------------|-------|-------|--|
| Equipment<br>Number | FUNCTION           | DESCRIPTION                        | VOLT/PHASE | VOLT/PHASE FACTORY FACTORY<br>STARTER DISCONNEC |              | SPP | CFM    | RPM  | (IN. WC.) | HP  | MAKE & MODEL                       | DRIVE | NOTES |  |
| EF-1                | GENERAL<br>EXHAUST | ROOF MOUNTED<br>UTILITY SET        | 120/1      | NO  | NO           | YES | 325    | 2052 | 0.325     | 1/3 | COOK MODEL<br>'60CPV'              | BELT  | 1     |  |
| EF-2                | GENERAL<br>EXHAUST | ROOF MOUNTED<br>UTILITY SET        | 120/1      | NO  | NO           | YES | 150    | 1262 | 0.325     | 1/3 | COOK MODEL<br>'60CPV'              | BELT  | 1     |  |
| EF-3                | CHEM. HOOD         | HIGH PLUME DILUTION<br>EXHAUST FAN | 208/3      | NO  | YES          | YES | 842(3) | 2614 | 0.5       | 1   | GREENHECK MODEL<br>'VEKTOR H-10-6' | BELT  | 2     |  |
| EF-4                | GENERAL<br>EXHAUST | ROOF MOUNTED<br>UTILITY SET        | 120/1      | NO  | NO           | YES | 250    | 1687 | 0.325     | 1/3 | COOK MODEL<br>'60CPV'              | BELT  | 1     |  |

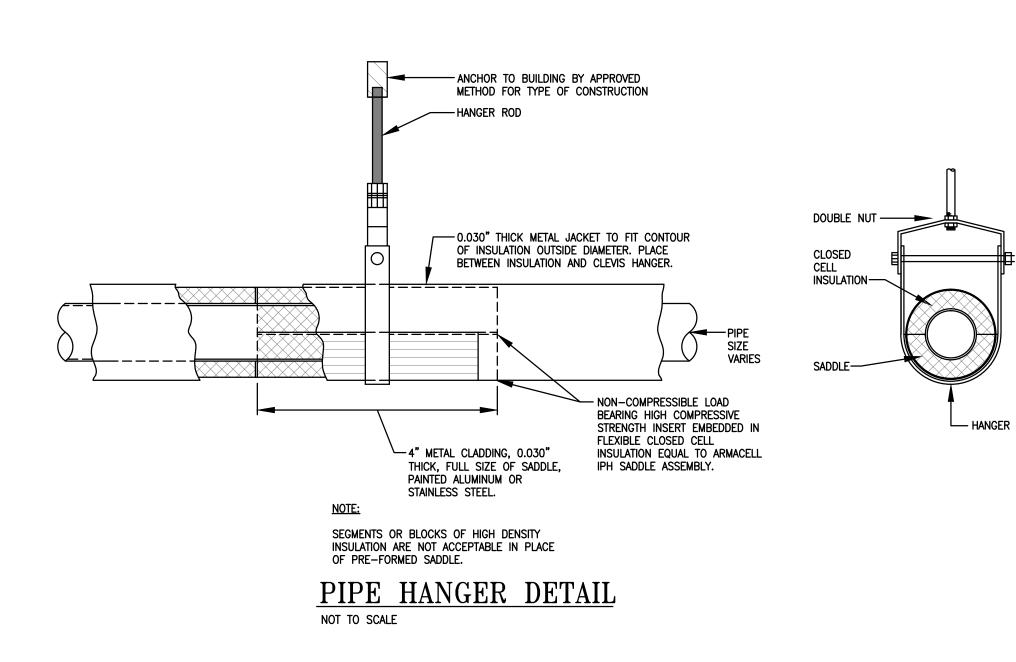
1. CONTRACTOR SHALL COORDINATE GRILLE BORDER TYPE WITH CEILING TYPE IN EACH SPACE. (-) = N.C.<152. NOT ALL SIZES MAY BE USED; VERIFY TYPES AND QUANTITIES WITH PLANS.







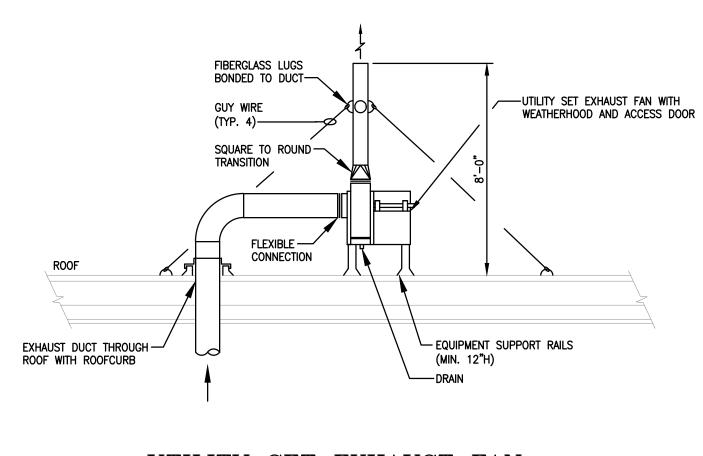
SLEEVE DETAIL NOT TO SCALE



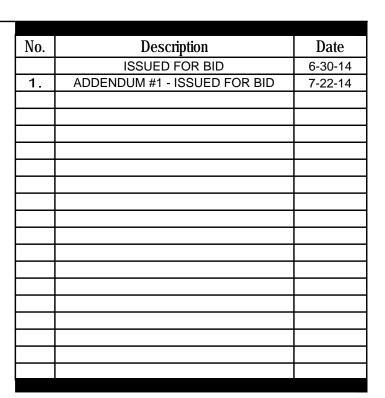
|                                     | N<br>IBOL                    |                  | SO           | UND AT     | <b>FTE</b> | NUA      | ATI N    | ١G       | UN        | IT              | SCE       | IED       | ULE             |                                     |         |
|-------------------------------------|------------------------------|------------------|--------------|------------|------------|----------|----------|----------|-----------|-----------------|-----------|-----------|-----------------|-------------------------------------|---------|
| EQUIPMENT                           | TYPE                         | SIZE             | CFM          | PD         |            |          |          |          |           | LOSS D<br>Reque |           |           | SYSTEM          | MAKE & MODEL                        | REMARKS |
| NUMBER                              |                              | (WxHxL)          |              | (IN. W.C.) | 63<br>1    | 125<br>2 | 250<br>3 | 500<br>4 | 1000<br>5 | 2000<br>6       | 4000<br>7 | 8000<br>8 | 0101Lim         |                                     |         |
| SAU-1                               | RECTANGULAR HIGH<br>VELOCITY | 36"x14"x60"      | 2,920        | 0.12       | 6          | 10       | 20       | 34       | 47        | 38              | 28        | 20        | rtu-1<br>Supply | PRICE MODEL 'RH60/1F'               | 1       |
| SAU-2                               | RECTANGULAR HIGH<br>VELOCITY | 16"x14"x60"      | 1,300        | 0.13       | 7          | 11       | 21       | 35       | 42        | 33              | 24        | 17        | rtu-1<br>Return | PRICE MODEL 'RH60/2F'               | 1       |
| SAU-3                               | RECTANGULAR HIGH<br>VELOCITY | 20"x14"x60"      | 1,665        | 0.16       | 7          | 14       | 25       | 35       | 42        | 32              | 20        | 14        | rtu-1<br>Return | PRICE MODEL 'RM60/4E'               | 1       |
| NOTES:<br>1. ATTENUAT<br>CONNECTION |                              | DED WITH 16 GAUG | e casing, 22 | GAUGE PERF | ORATE      | d linei  | R, GLA   | ss fib   | BER AC    | OUSTIC          | MEDIA     | , FIBE    | RGLASS CLOT     | "H LINER AND 2" SLIP INLET & OUTLET |         |

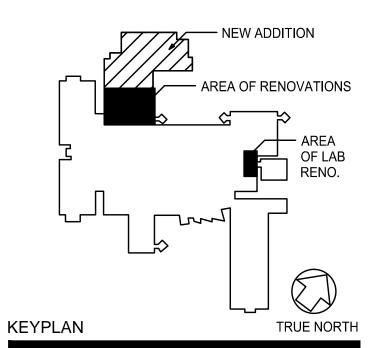
| VAV PLAN<br>SYMBOL VARIABLE AIR VOLUME BOX SCHEDULE |                                   |           |                   |      |             |             |                       |             |             |             |     |                  |       |  |
|---|-----------------------------------|-----------|-------------------|------|-------------|-------------|-----------------------|-------------|-------------|-------------|-----|------------------|-------|--|
| EQUIPMENT<br>NUMBER                                 | CI<br>MIN.                        | ™<br>MAX. | TSP<br>(IN. W.C.) | SIZE | EAT<br>(°F) | LAT<br>(°F) | COIL APD<br>(IN. WG.) | HEAT<br>MBH | EWT<br>(°F) | LWT<br>(°F) | GPM | WPD<br>(FT. HD.) | NOTES |  |
| VAV-1   | JOHNSON CONTROLS<br>MODEL 'TSS-W' | 200       | 435               |      | 6           | 55          | 95                    | 1 ROW/0.03  | 18.8        | 160         | 140 | 1.9              | 1.0   |  |

| CAV PLAN<br>SYMBOL CONSTANT AIR VOLUME BOX SCHEDULE |                                   |      |                   |      |             |             |                       |             |             |             |     |                  |      |
|---|-----------------------------------|------|-------------------|------|-------------|-------------|-----------------------|-------------|-------------|-------------|-----|------------------|------|
| equipment<br>Number                                 | MAKE & MODEL                      | CFM  | TSP<br>(IN. W.C.) | SIZE | EAT<br>(°F) | LAT<br>(°F) | COIL APD<br>(IN. WG.) | HEAT<br>MBH | EWT<br>(°F) | LWT<br>(°F) | GPM | WPD<br>(FT. HD.) | NOTE |
| CAV-1   | JOHNSON CONTROLS<br>MODEL 'TSS-W' | 1210 | -                 | 10   | 55          | 95          | 2 ROW/0.33            | 52.2        | 160         | 140         | 4.0 | 5.0              | _    |
| CAV-2   | JOHNSON CONTROLS<br>MODEL 'TSS-W' | 1275 | -                 | 10   | 55          | 95          | 2 ROW/0.33            | 54          | 160         | 140         | 4.0 | 5.0              | _    |



UTILITY SET EXHAUST FAN AND DUCT DETAIL NOT TO SCALE





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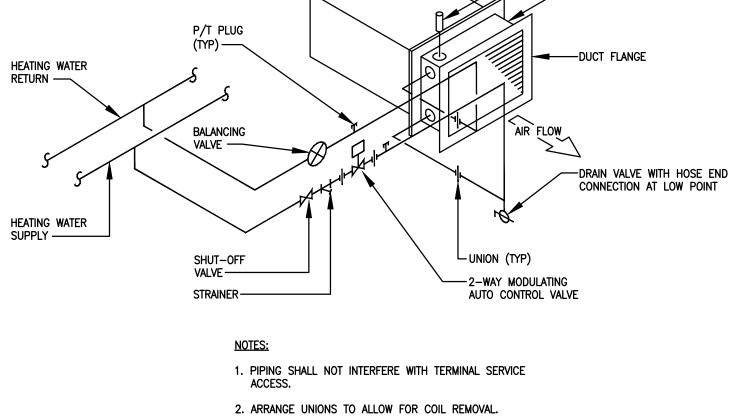




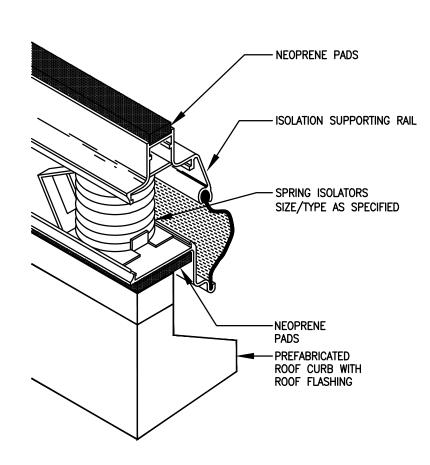
# VAV & CAV TERMINAL REHEAT COIL PIPING DETAIL NOT TO SCALE

EXCEED ONE ROW DEPTH.

3. INSTALL FOR COUNTERFLOW OF AIR & WATER WHEN COILS

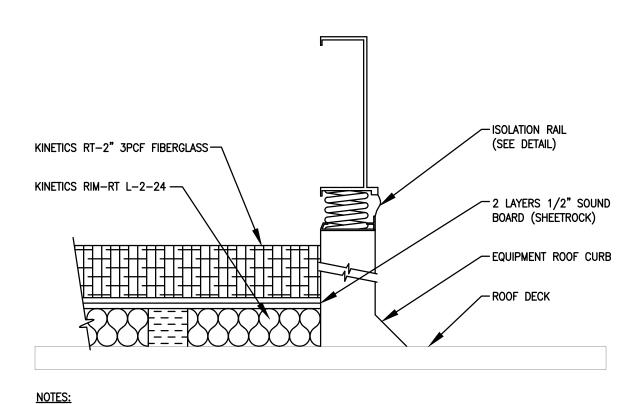


# ROOF MOUNTED UNIT ISOLATION RAIL DETAIL NOT TO SCALE

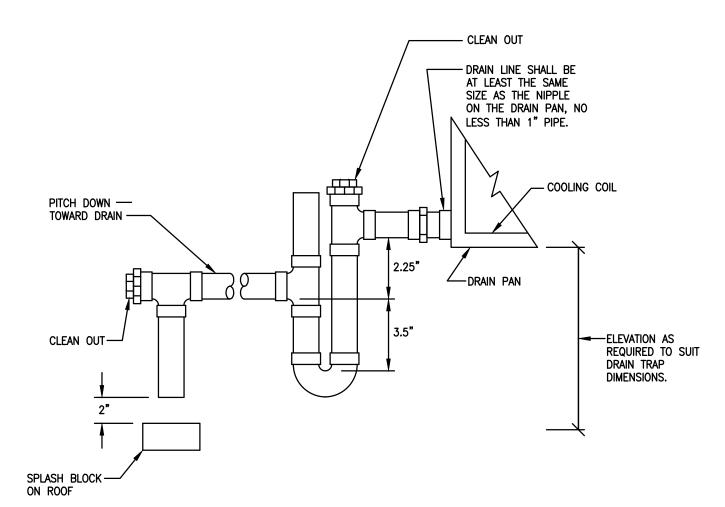


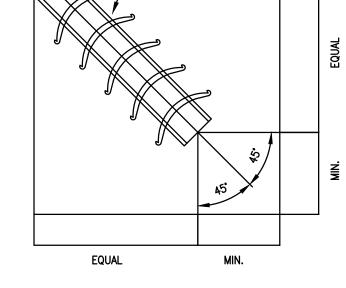
# ROOFTOP UNIT ACOUSTIC PACKAGE DETAIL NOT TO SCALE

- 5. PROVIDE ROOF OPENING LARGE ENOUGH TO ACCOMMODATE DUCT CONNECTION AT UNIT. 6. PROVIDE DUCT LAGGING, EQUAL TO KINETICS TYPE KNM-100-ALQ-2, ON SUPPLY AND RETURN AIR DUCTS FROM UNDERSIDE OF ROOF TO FIRST BRANCH CONNECTION OR FIRST 25 FEET. PROVIDE NEAT FIT AT JOINTS AND CORNERS PER MANUFACTURER'S WRITTEN INSTRUCTIONS.
- 4. PROVIDE ACOUSTIC TREATMENT PACKAGE WITHIN ROOF CURB PER MANUFACTURER'S WRITTEN INSTRUCTIONS. INSTALL ON ROOF DECK TO COVER THE ENTIRE AREA WITHIN CURB. INSTALL ISOLATION BOARD AROUND PERIMETER OF CURB AND ALL PENETRATIONS WITH ALL JOINTS SEALED. PACKAGE SHALL INCLUDE 2" THICK RESILIENT DECOUPLER, A 3 PSF HIGH MASS BARRIER AND AN ABSORBER WITH MINIMUM SOUND COEFFICIENT OF 0.26 AT 125 Hz. PROVIDE MINIMUM AIR SPACE OF 10" BETWEEN BOTTOM OF ROOFTOP UNIT PAN AND TOP OF ACOUSTIC PACKAGE. RESILIENT DECOUPLER SHALL BE ROLLOUT ISOLATION MEDIA WITH LOW DENSITY ABSORPTION BLANKET AND MOLDED, PRECOMPRESSED, HIGH DENSITY FIBERGLASS PADS DESIGNED FOR MAXIMUM TRANSMISSION LOSS. PACKAGE SHALL BE EQUAL TO KINETICS NOISE CONTROL, TYPE RT-4S4.
- 3. FIT SHEETROCK CLOSELY TO PERIMETER OF CURB.
- 2. STAGGER JOINTS ON SHEETROCK.
- 1. LOCATE PADS IN RIM MATERIAL TO ADEQUATELY SUPPORT SHEETROCK.



# CONDENSATE DRAIN TRAP DETAIL NOT TO SCALE



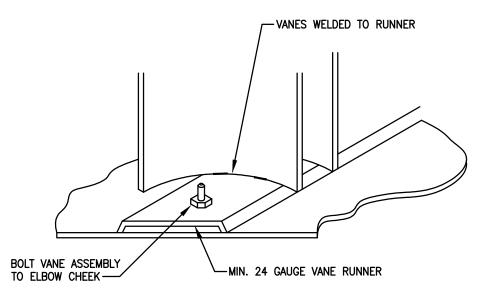


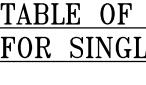
VANED ELBOW DETAIL

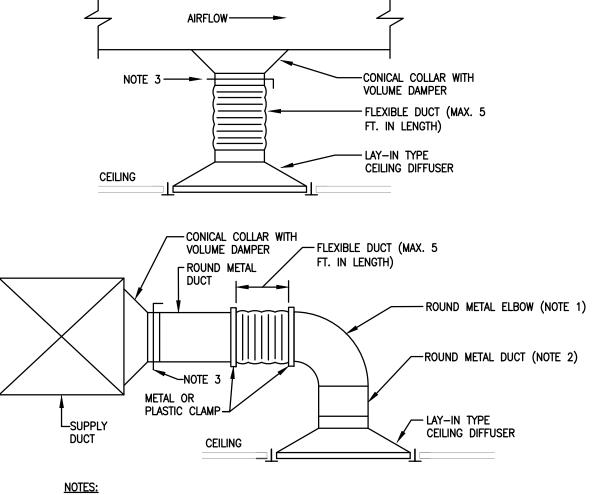
NOT TO SCALE

VANE RUNNER ASSEMBLY DETAIL NOT TO SCALE

- VANE RUNNER ASSEMBLY





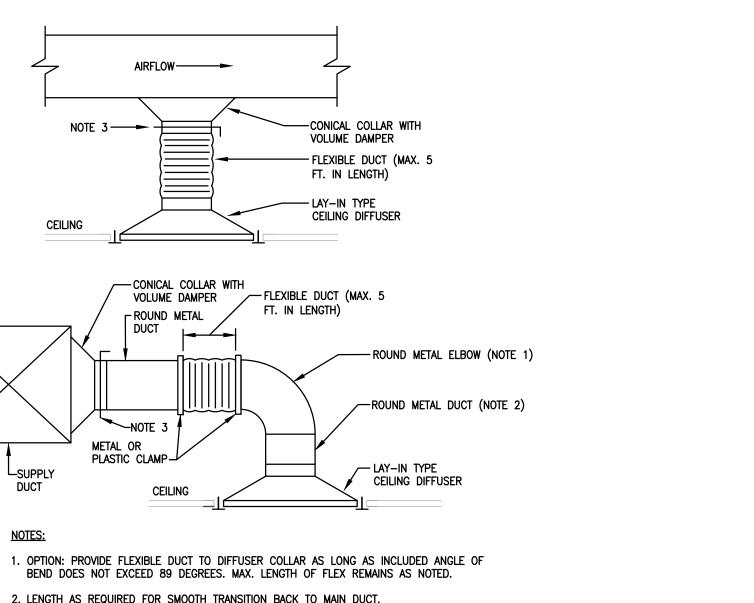


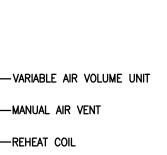
2. LENGTH AS REQUIRED FOR SMOOTH TRANSITION BACK TO MAIN DUCT.

**DIFFUSER CONNECTION DETAIL** 

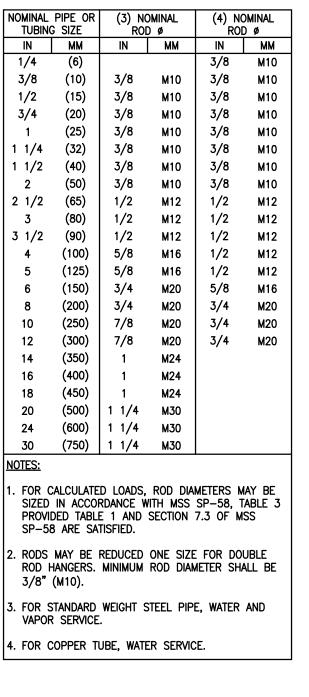
3. PAINT HANDLE OF VOLUME DAMPER FLUORESCENT ORANGE.

NOT TO SCALE





-REHEAT COIL



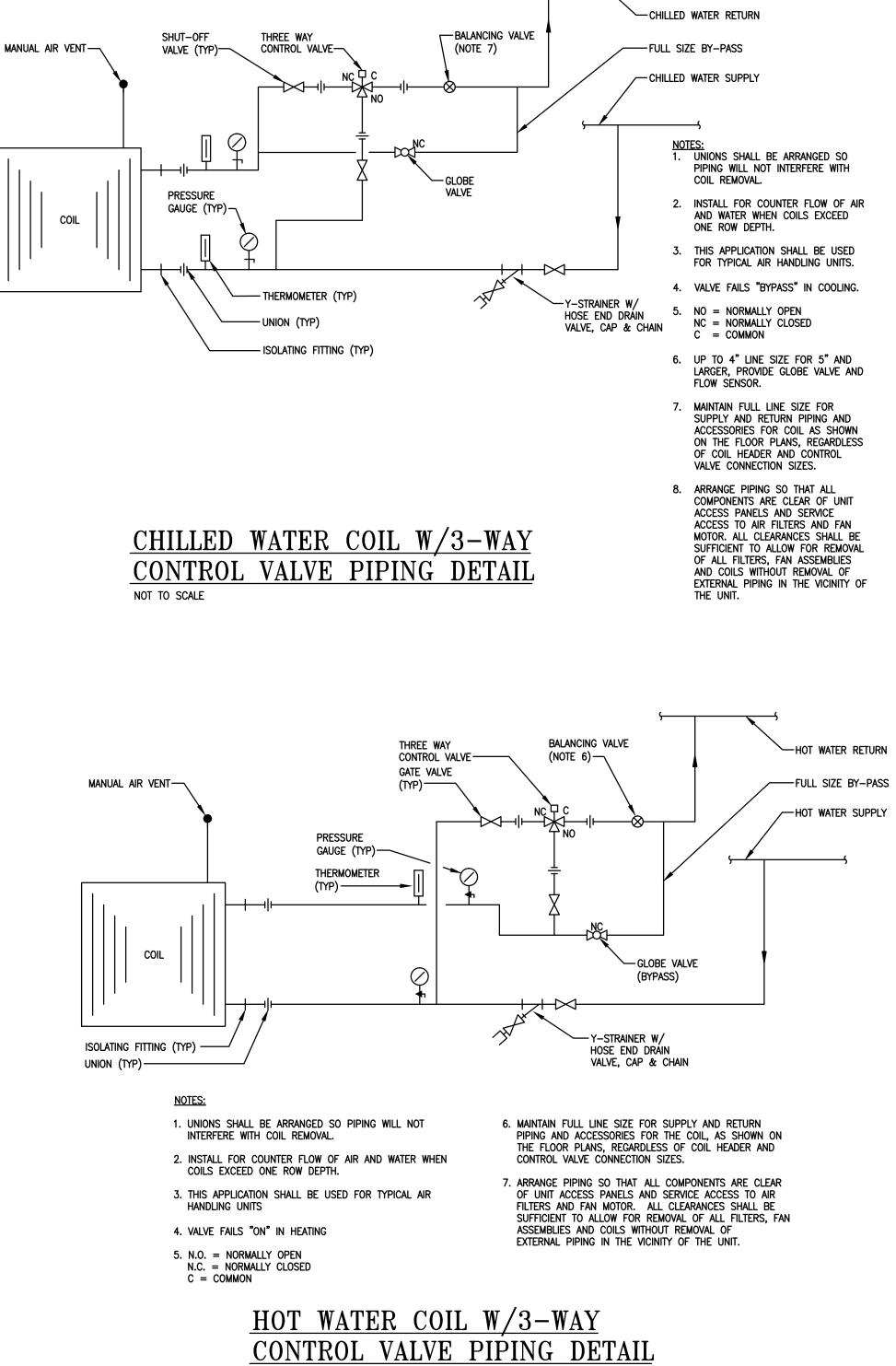
# TABLE OF MINIMUM ROD DIAMETER FOR SINGLE RIGID ROD HANGERS<sup>(1)(2)</sup>

| PIPING SUPPORT  | SPACING                                 | TABLE                                 |
|---|---|---------------------------------------|
| PIPING MATERIAL                                       | MAXIMUM<br>HORIZONTAL SPACING<br>(FEET) | MAXIMUM<br>VERTICAL SPACING<br>(FEET) |
| ABS PIPE  | 4                                       | 10 <sup>b</sup>                       |
| ALUMINUM PIPE AND TUBING                              | 10                                      | 15                                    |
| BRASS PIPE  | 10                                      | 10                                    |
| BRASS TUBING, 1 1/4"Ø AND SMALLER                     | 6                                       | 10                                    |
| BRASS TUBING, 1 1/2"Ø AND LARGER                      | 10                                      | 10                                    |
| CAST-IRON PIPE <sup>a</sup>                           | 5                                       | 15                                    |
| COPPER OR COPPER-ALLOY PIPE                           | 12                                      | 10                                    |
| COPPER OR COPPER-ALLOY TUBING, 1 1/4"ø<br>AND SMALLER | 6                                       | 10                                    |
| COPPER OR COPPER-ALLOY TUBING, 1 1/2"ø<br>AND LARGER  | 10                                      | 10                                    |
| CPVC PIPE OR TUBING, 1" AND SMALLER                   | 3                                       | 10 <sup>b</sup>                       |
| CPVC PIPE OR TUBING, 1 1/4" AND LARGER                | 4                                       | 10 <sup>b</sup>                       |
| steel pipe  | 12                                      | 15                                    |
| STEEL TUBING  | 8                                       | 10                                    |
| LEAD PIPE   | CONTINUOUS                              | 4                                     |
| PB PIPE OR TUBING                                     | 2 2/3<br>(32 INCHES)                    | 4                                     |
| PEX TUBING  | 2 2/3<br>(32 INCHES)                    | 10 <sup>b</sup>                       |
| PVC PIPE  | 4                                       | 10 <sup>b</sup>                       |

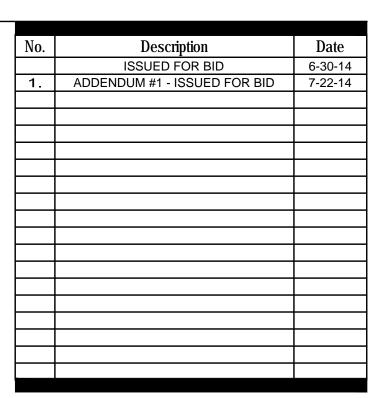
a. THE MAXIMUM HORIZONTAL SPACING OF CAST-IRON PIPE HANGERS SHALL BE INCREASED TO 10 FEET WHERE 10 FOOT LENGTHS OF PIPE ARE INSTALLED.

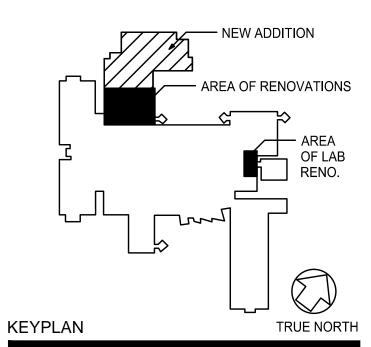
NOTES:

b. MID-STORY GUIDE.



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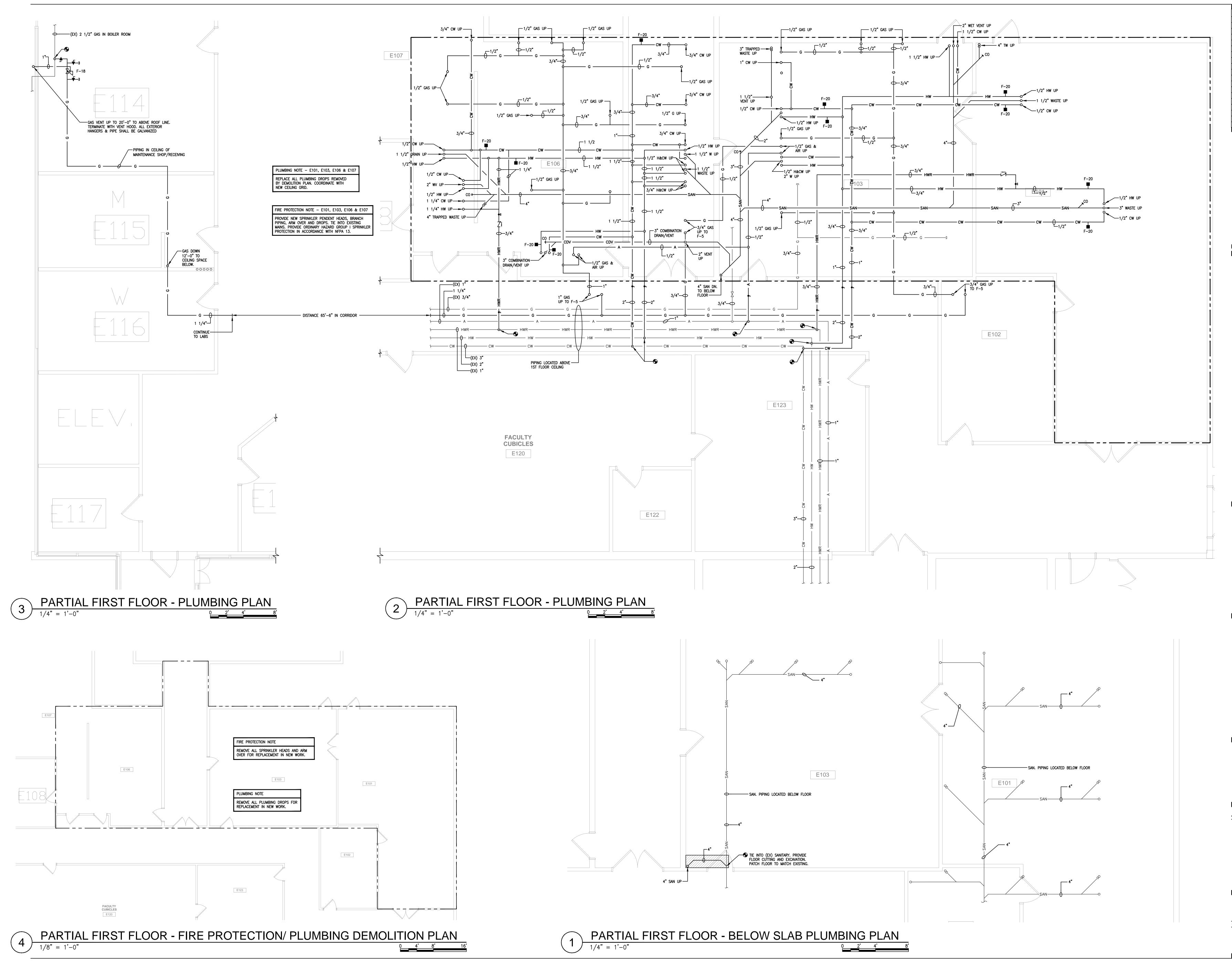
MEP

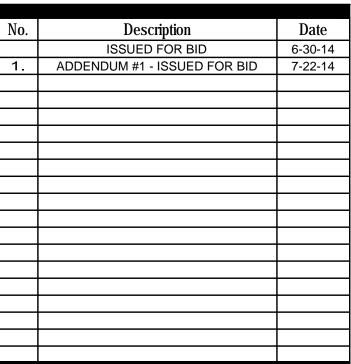
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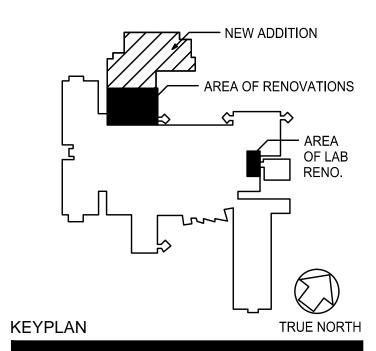
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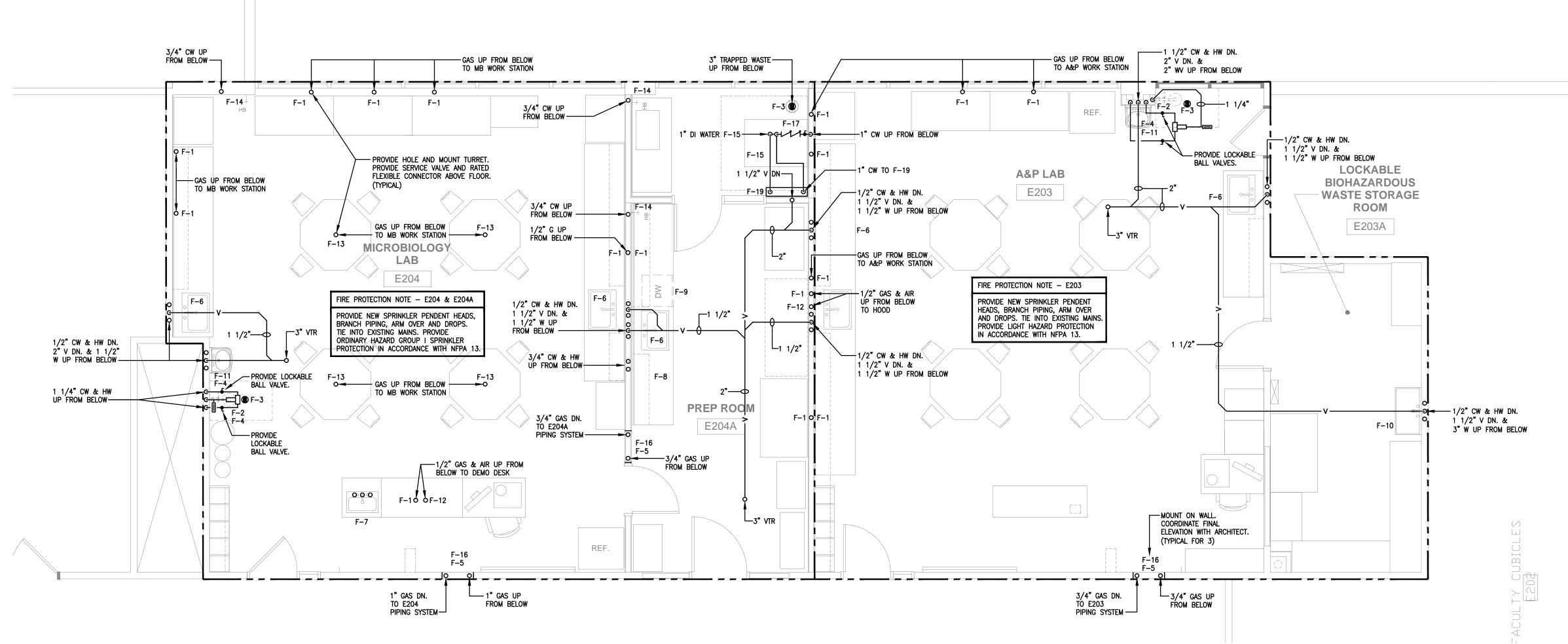
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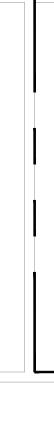








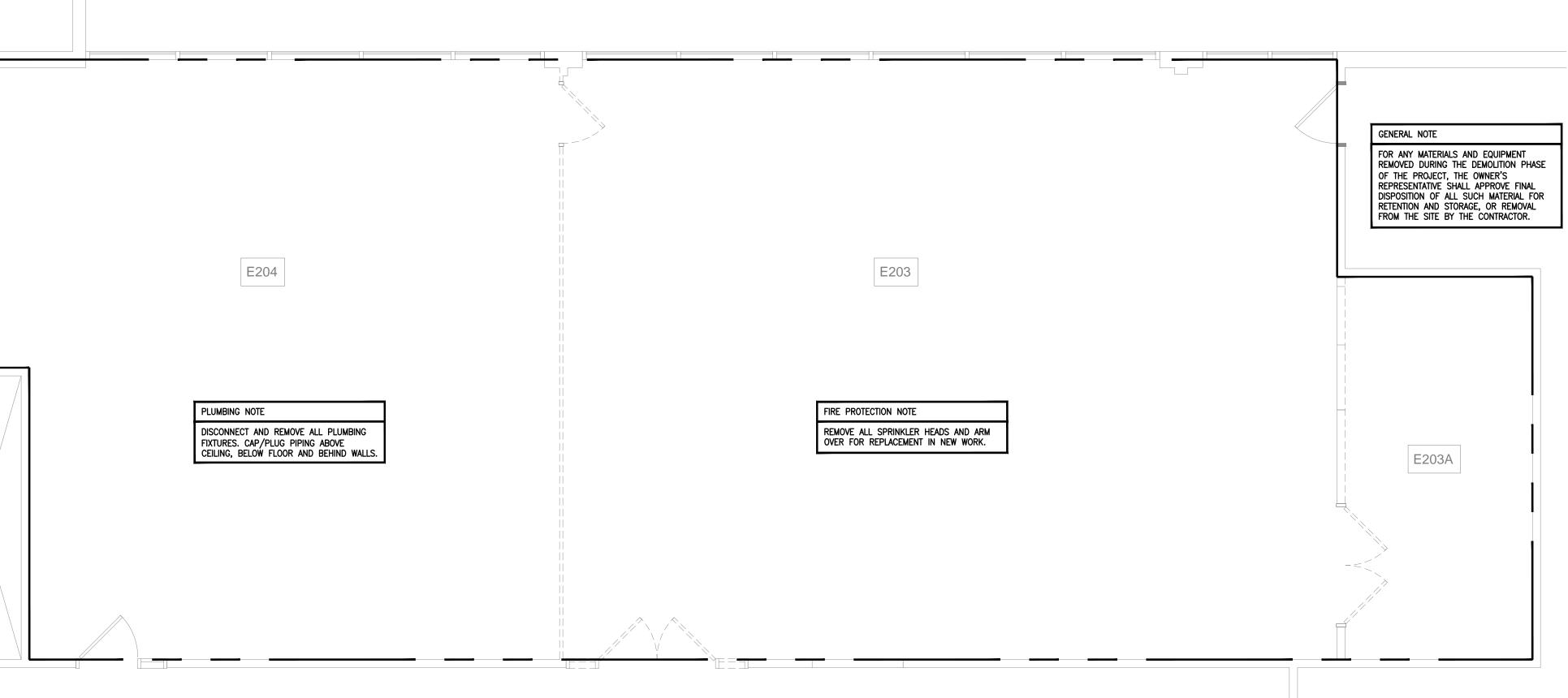
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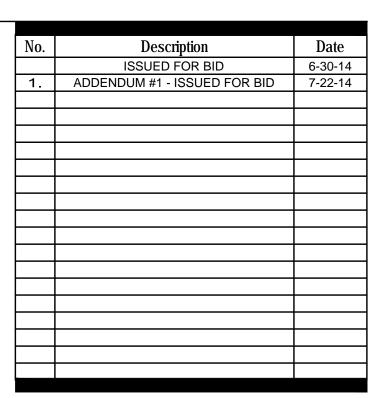


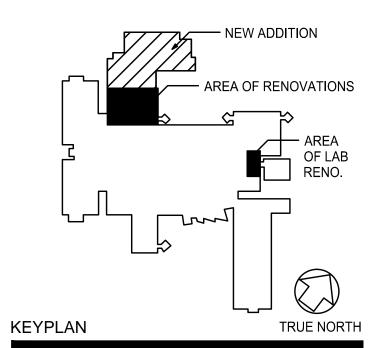
、1 <sup>`</sup>

# SECOND FLOOR - FIRE PROTECTION/PLUMBING PLAN 1/4" = 1'-0"0 2' 4' 8'



) SECOND FLOOR - FIRE PROTECTION/PLUMBING DEMOLITION PLAN 1/4" = 1'-0"0 2' 4' 8'





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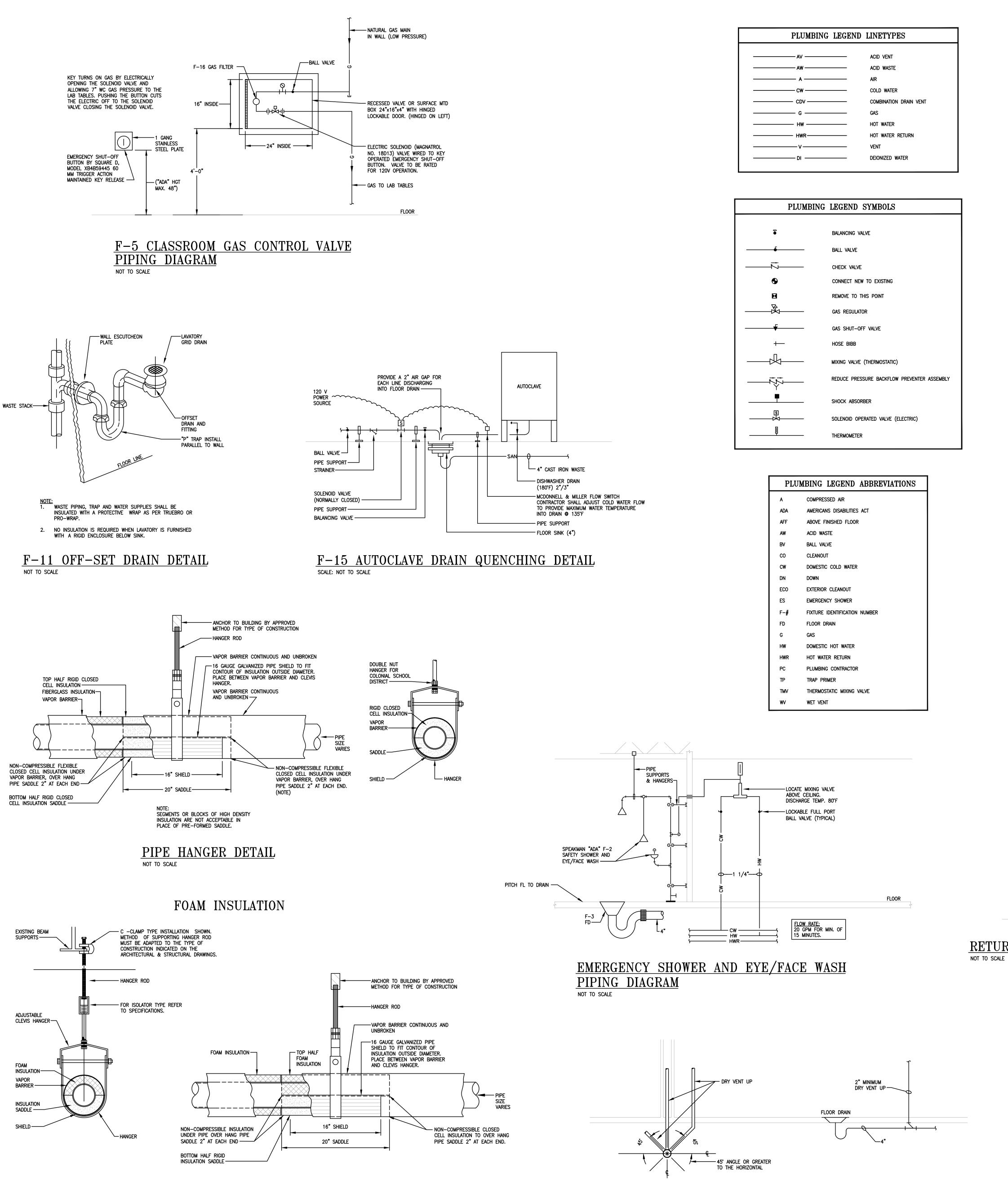
MEP

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TYPICAL PIPE INSULATION ON HANGER DETAIL

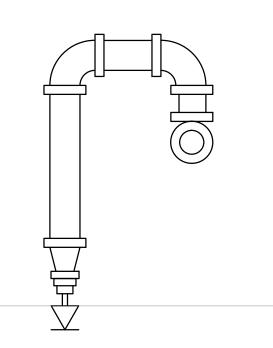
NOT TO SCALE

|                                  | PLUMBING LEGEND LINETYPES   |      |  |                                | PL                             | UMBI                      | NG F                           | TIXTU             | RE /   | EQU   | IPME           | NT SCHEDULE  |
|----------------------------------|---|------|--|--------------------------------|--------------------------------|---------------------------|--------------------------------|-------------------|--------|-------|----------------|--|
|                                  | AV ACID VENT  | ITEM | DESCRIPTION                              | CW                             | нพ                             | SOIL<br>WASTE             | TRAP                           | SETTING<br>HEIGHT | GAS    | STORM | COND.<br>WASTE | SPECIFICATIONS/REMARKS   |
|                                  | AW ACID WASTE A AIR   | F-1  | GAS TURRET                               | -                              | _                              | -                         | _                              | _                 | -      | -     | -              | ZURN Z88000-AR DECK MOUNTED SINGLE HOLE LAB TURRET WITH Z8001B VALVE.<br>LABEL GAS. PROVIDE SERVICE VALVE AND FLEXIBLE CONNECTOR ABOVE FLOOR. PC<br>SHALL PROVIDE HOLE AND MOUNT TURRET IN TOP.  |
|                                  |   | F-2  | EMERGENCY<br>SHOWER/EYEWASH<br>HANDICAPP | 1 1/4"                         | _                              | -                         | -                              | -                 | -      | -     | -              | SPEAKMAN MODEL SE-690 WCH SAFETY SHOWER/EYEWASH WITH 8" SE-870 SHOW<br>HEAD 1" CHROME PLATED VALVE. 1 1/4" GALVINIZED STEEL STANCHION. PAINTED<br>SAFETY GREEN. SE-490 EYE/FACE WASH, HANDICAP ACCESSIBLE WITH LONGER PUI<br>HANDLE AND LOWER EYE/FACE WASH. INSTALL MIXING VALVE ABOVE CEILING FOR<br>TEMPERATURE CONTROL. MIXING VALVE SHALL MEET ANSI 2358.1 REQUIREMENTS.  |
|                                  |   | F-3  | FLOOR DRAIN<br>(GENERAL)                 | -                              | -                              | 4"                        | 4"<br>DEEP<br>SEAL             | -                 | -      | -     | -              | JAY R. SMITH 2005 A CAST IRON BODY, ROUND TOP, NICKEL BRONZE STRAINER, VANDAL PROOF SCREWS. TRAP PRIMER TAP. PROVIDE TRAP PRIMER PIPING FROM $F-4$ .   |
|                                  | DI DEIONIZED WATER  | F-4  | AUTO-TRAP<br>PRIMER                      | 1/2"                           | -                              | -                         | -                              | -                 | -      | _     | -              | PRECISION PLUMBING PRODUCTS INC CPO-500 WITH DISTRIBUTION UNIT DU-3.   |
|                                  | PLUMBING LEGEND SYMBOLS BALANCING VALVE   | F-5  | EMERGENCY<br>GAS SHUT-OFF<br>VALVE & BOX | -                              | -                              | -                         | -                              | BY<br>ARCH.       | VARIES | -     | -              | 18 GAUGE BAKED ENAMELED FINISH COMPLETE WITH REMOVABLE ACCESS DOOR<br>COMPLETE WITH (1) THREE PIECE BALL VALVE <u>NOTE</u> : FIELD INSTALL GAS VALVE &<br>SOLENOID VALVE. A 30"x24"x6" ZONE VALVE BOX SHALL BE CONSTRUCTED OF 16<br>GAUGE STEEL WITH BAKED ENAMEL WHITE FINISH, REMOVABLE ACCESS DOOR. PIPIN<br>GAS SERVICE VALVE AND GAS SOLENOID VALVE SHALL BE PROVIDED BY PLUMBING<br>CONTRACTOR. THE PLUMBING CONTRACTOR SHALL VERIFY THE UL LISTING FOR FUE<br>GAS PRIOR TO INSTALLATION OF THE GAS SOLENOID VALVE. SEE PLUMBING DETAIL<br>FOR GAS VALVE BOX INSTALLATION. CO-ORDINATE VOLTAGE 120V. |
|                                  | BALL VALVE  | F-6  | Countertop sink                          | 1/2"                           | 1/2"                           | _                         | 1 1/2"                         | -                 | -      | _     | -              | SINK PROVIDED WITH COUNTERTOP LK-2445BH HI-ARC FAUCET BASKET STRAINER, TRAP WITH CO, VALVES, AND SUPPLIES.   |
|                                  | CONNECT NEW TO EXISTING   | F-7  | ISLAND<br>Countertop Sink                | 1/2"                           | 1/2"                           | _                         | 1 1/2"                         | -                 | -      | _     | -              | SINK PROVIDED WITH COUNTERTOP LK-2445BH HI-ARC FAUCET BASKET STRAINER, TRAP WITH CO, VALVES, AND SUPPLIES.   |
|                                  | GAS REGULATOR   | F-8  | COUNTERTOP<br>EYEWASH                    | -                              | _                              | _                         | _                              | -                 | -      | _     | -              | SPEAKMAN SE-927 COMBINATION EYEWASH AND DRENCH HOSE. PROVIDE SE-370 THERMOSTATIC MIXING VALVE.   |
|                                  | GAS SHUT-OFF VALVE  | F-9  | DISHWASHER                               | -                              | 1/2"                           | 1"                        | -                              | -                 | -      | _     | -              | PROVIDED BY OWNER. PC SHALL PROVIDE ALL ROUGH AND FINAL CONNECTIONS.<br>PROVIDE AIR GAP FITTING FOR DRAIN CONNECTION.  |
|                                  | MIXING VALVE (THERMOSTATIC)   | F-10 | utility sink                             | 1/2"                           | 1/2"                           | 3"                        | 3"                             | -                 | -      | _     | -              | AMERICAN STANDARD "AKRON" 7695.008 ENAMELED CAST IRON SINK WITH STAND,<br>TRAP 24"x20". SPEAKMAN SEF-9000-TW EYESAVER FAUCET.  |
|                                  | REDUCE PRESSURE BACKFLOW PREVENTER ASSEMBLY                                       | F-11 | ADA SINK                                 | 1/2"                           | 1/2"                           | 1 1/2"                    | <u>1 1/4"</u><br><u>1 1/2"</u> | *                 | -      | _     | -              | AMERICAN STANDARD "LUCERNE" 0355.012 WALL HUNG CHINA LAVATORY, 4" CEN<br>WITH DELTA MODEL 523-HGMHDF-PST CHROME FAUCET WITH TRIM PLATE FOR 4<br>CENT. SET, INCLUDING WALL SUPPLIES, OFFSET GRID DRAIN ASSEMBLY "P" TRAP<br>CO FIXTURE CARRIER SUPPORT. PROVIDE LAVATORY PROTECTION SHIELD ENCLOSU<br>INSTALLATION SHALL COMPLY WITH ADA REQUIREMENTS.  |
|                                  | SI SOLENOID OPERATED VALVE (ELECTRIC)   | F-12 | AIR TURRET                               | -                              | _                              | _                         | -                              | -                 | -      | _     | -              | ZURN Z88000-AR DECK MOUNTED SINGLE HOLE LAB TURRET WITH Z8001B VALV<br>LABEL AIR. PROVIDE SERVICE VALVE AND FLEXIBLE CONNECTOR ABOVE FLOOR. PO<br>SHALL PROVIDE HOLE AND MOUNT TURRET IN TOP.  |
|                                  |   | F-13 | GAS TURRET<br>4-POSITION                 | _                              | -                              | _                         | _                              | -                 | -      | _     | -              | ZURN Z88400 DECK MOUNTED FOUR HOLE LAB TURRET WITH (4) Z8001B VALVE<br>LABEL GAS. PROVIDE SERVICE VALVE AND FLEXIBLE CONNECTOR ABOVE FLOOR. I<br>SHALL PROVIDE HOLE AND MOUNT TURRET IN TOP.   |
|                                  | PLUMBING LEGEND ABBREVIATIONS   | F-14 | HOSE BIBB                                | 1/2"                           | _                              | _                         | _                              | 18"<br>A.A.F.     | _      | _     | _              | WOODFORD MODEL 24. BRASS CONSTRUCTION WITH PACKING NUT-DEEP STEM GI<br>BUILT-IN VACUUM BREAKER AND WHEEL HANDLE. <u>NOTE:</u> CHROME FINISH IN FINIS<br>BUILDING AREAS. ROUGH BRONZE IN UNFINISHED AREAS.  |
| TCH<br>D WATER FLOW<br>IPERATURE | ACOMPRESSED AIRADAAMERICANS DISABILITIES ACTAFFABOVE FINISHED FLOORAWACID WASTE   | F–15 | Sterilizer                               | 3/4"                           | -                              | 2"<br>INDIRECT<br>AIR GAP | -                              | -                 | -      | -     | -              | PLUMBING CONTRACTOR TO FURNISH AND INSTALL STERILIZER: AMSCO LAB 250 S<br>SCIENTIFIC LABORATORY STEAM STERILIZER. 20"X20"X38", VACUUM, MANUAL VERTI<br>SLIDING DOOR, SINGLE DOOR CABINET, STANDARD PIPING: BRASS & COPPER<br>THREADED, ELECTRIC STEAM GENERATOR (CARBON STEEL), 120V 1 PH, 208V 3 F<br>LOADING RACK & (2) SHELVES INCLUDING FACTORY INSTALLATION, TRAINING, & 2<br>YEAR WARRANTY. STERIS CORPORATION, 1–800–444–9009. PC SHALL PROVIDE A<br>ROUGH AND FINAL CONNECTIONS. PROVIDE WASTE WATER QUENCHER. SEE DETAIL  |
|                                  | BV BALL VALVE<br>CO CLEANOUT  | F-16 | GAS FILTER                               | -                              | -                              | -                         | -                              | -                 | -      | _     | -              | MAXITROL CO. MODEL GF, ALUMINUM HOUSING, FILTER CONSISTS OF POLYPROPYL<br>IMPREGNATED FLEECE, MAXIMUM OPERATING PRESSURE OF 15 PSI, AMBIENT<br>TEMPERATURE OF 175' F.  |
|                                  | CW DOMESTIC COLD WATER<br>DN DOWN<br>ECO EXTERIOR CLEANOUT                        | F-17 | BACKFLOW<br>PREVENTER<br>(RPZ)           | 1"                             | -                              | _                         | -                              | -                 | -      | -     | -              | WATTS 909 QT. REDUCED PRESSURE BACK FLOW PREVENTER. PROVIDE A STRAIN AHEAD OF THE BFP AND FUNNEL & DRAIN PIPING TO F.D.  |
|                                  | ECO EXTERIOR CLEANOUT<br>ES EMERGENCY SHOWER<br>F-# FIXTURE IDENTIFICATION NUMBER | F-18 | GAS REGULATOR                            | -                              | _                              | -                         | -                              | -                 | 1 1/4" | _     | -              | FISHER REGULATOR NPS 1 1/4" CS400, 1 1/4" NPT, 3/16" ORIFICE, INLET PR<br>125 PSI MAXIMUM, SPRING RANGE 6" TO 8" WC. SET POINT 7" WC PIPE VENT<br>CONNECTION TO EXTERIOR.  |
|                                  | FD FLOOR DRAIN<br>G GAS<br>HW DOMESTIC HOT WATER<br>HWR HOT WATER RETURN          | F-19 | DEIONIZED WATER<br>GENERATOR             | -                              | -                              | _                         | _                              | -                 | -      | -     | -              | DI WATER SYSTEM CONTRACTOR TO FURNISH AND INSTALL A COMPLETE WALL<br>MOUNTED SYSTEM CONSISTING OF INLET PRESSURE VALVE, INLET ISOLATION VALV<br>(1) CARBON PRE-FILTER HOUSING & CARTRIDGE, (2) 940 MIXED BED TANKS, (1)<br>POST FILTER HOUSING & CARTRIDGE, OUTLET ISOLATION VALVE, PRESSURE GAUGI<br>(INLET & OUTLET) FOR PRE-FILTER AND POST FILTER, TUBING, LIGHTS, AND<br>MOUNTING BRACKETS FOR A COMPLETE SYSTEM. FURNISH AND INSTALL A TIMER<br>WIRED TO SOLENOID VALVES TO ALLOW SYSTEM SLUSH TO DRAIN. RES-KEM GEN<br>WATER SERVICES: (610) 358-0717.  |
|                                  | PC PLUMBING CONTRACTOR<br>TP TRAP PRIMER<br>TMV THERMOSTATIC MIXING VALVE         | F-20 | SHOCK ABSORBER                           | "A" 1/2"<br>"B" 3/4"<br>"C" 1" | "A" 1/2"<br>"B" 3/4"<br>"C" 1" | _                         | -                              | -                 | -      | _     | -              | PRECISION PLUMBING PRODUCTS (PPP) "SC" SERIES BARREL FABRICATED TYPE "<br>COPPER WITH WROUGHT COPPER FITTING, PISTON, "O" RING AND LUBRICATED.<br>TEMPERATURE RANGE -40 DEG. F TO 212 DEG. F.  |

| PLU | MBING LEGEND ABBREVIATIONS    |
|-----|-------------------------------|
| Α   | COMPRESSED AIR                |
| ADA | AMERICANS DISABILITIES ACT    |
| AFF | ABOVE FINISHED FLOOR          |
| AW  | ACID WASTE                    |
| BV  | BALL VALVE                    |
| СО  | CLEANOUT                      |
| CW  | DOMESTIC COLD WATER           |
| DN  | DOWN                          |
| ECO | EXTERIOR CLEANOUT             |
| ES  | EMERGENCY SHOWER              |
| F—# | FIXTURE IDENTIFICATION NUMBER |
| FD  | FLOOR DRAIN                   |
| G   | GAS                           |
| HW  | DOMESTIC HOT WATER            |
| HWR | HOT WATER RETURN              |
| PC  | PLUMBING CONTRACTOR           |
| TP  | TRAP PRIMER                   |
| TMV | THERMOSTATIC MIXING VALVE     |
| w   | WET VENT                      |

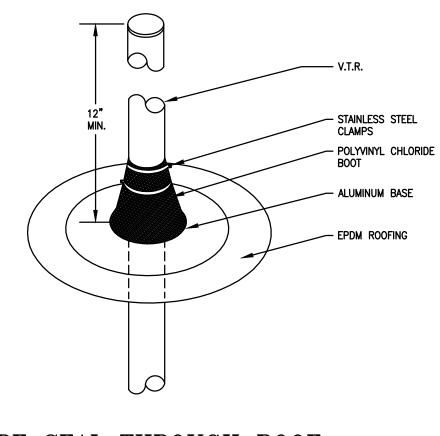
VENT CONNECTION TO HORIZONTAL DRAIN NOT TO SCALE

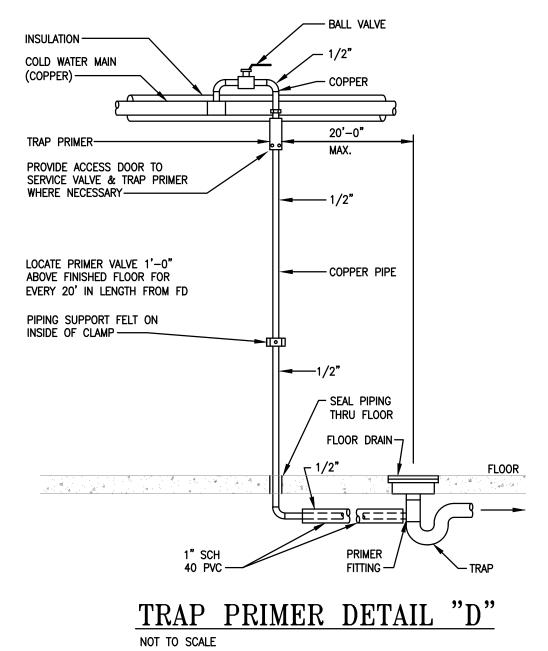
FLOOR DRAIN VENTING NOT TO SCALE



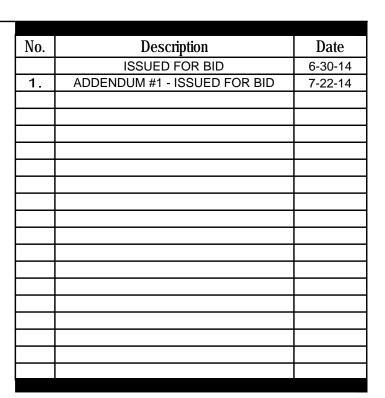
# RETURN BEND/ARM-OVER ARRANGEMENT

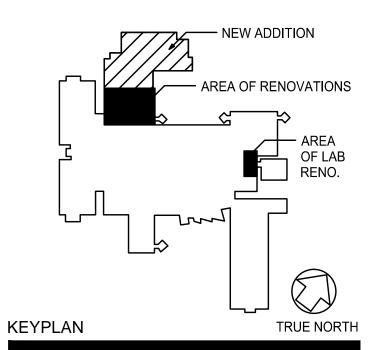
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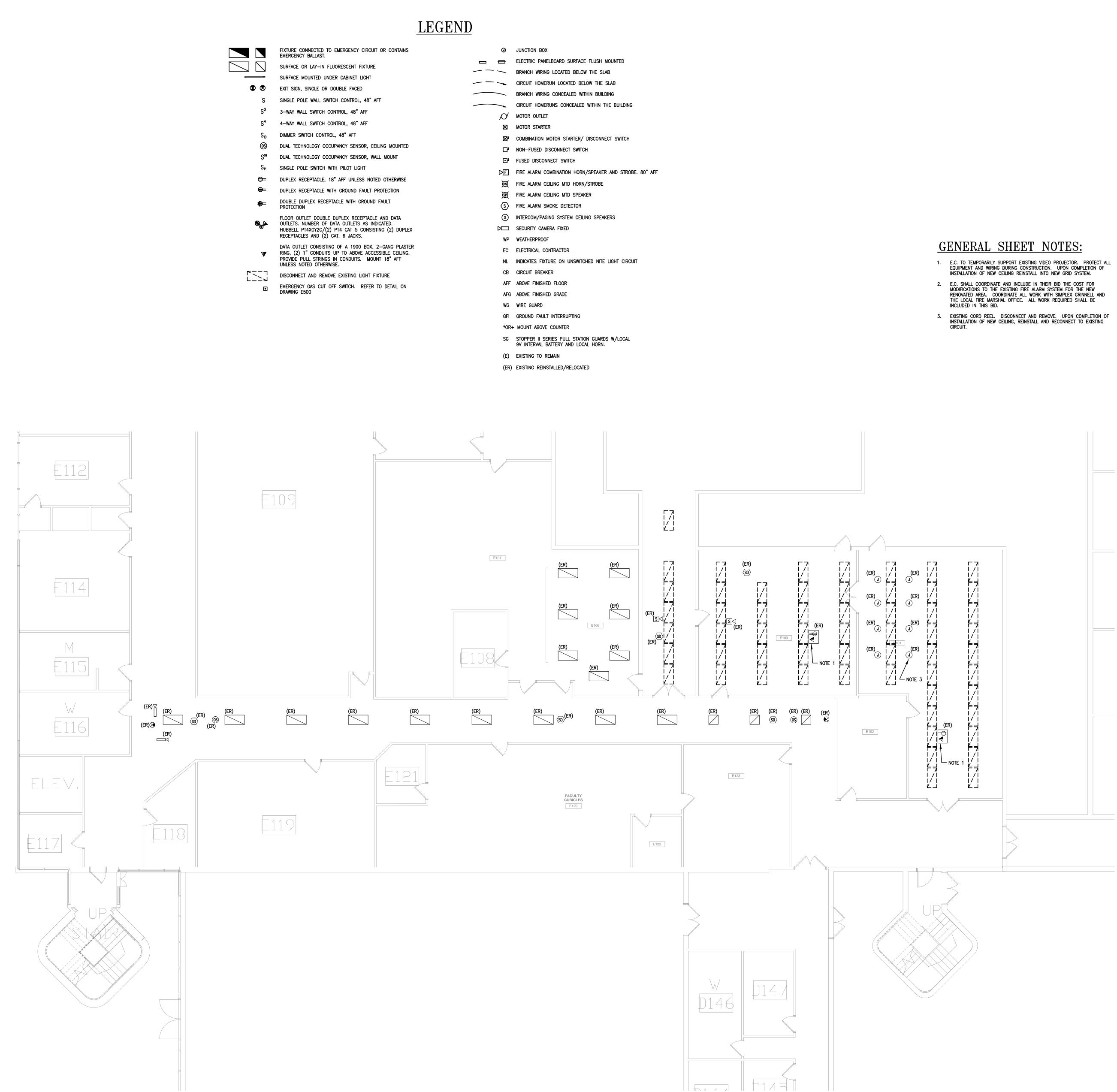
> MEP **Furlow Associates** 1206 Society Drive Claymont, DE 19703

302.798.3515

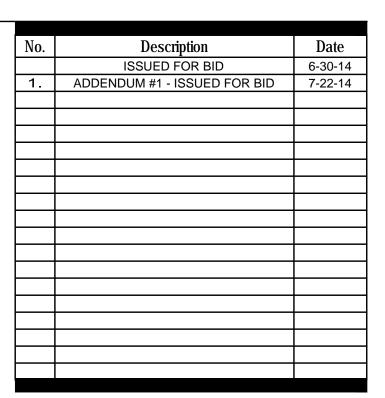
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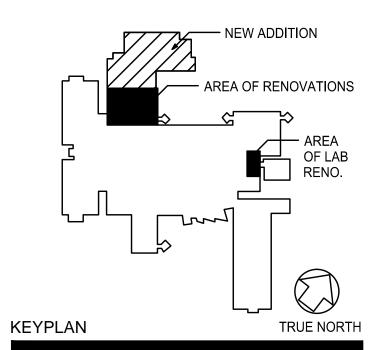








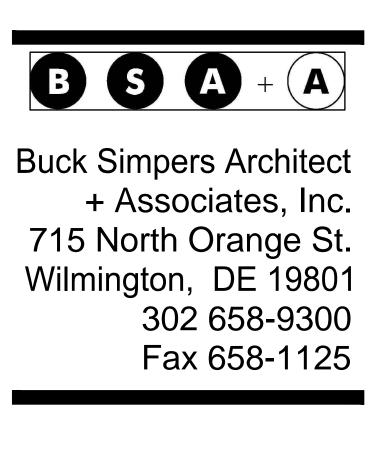




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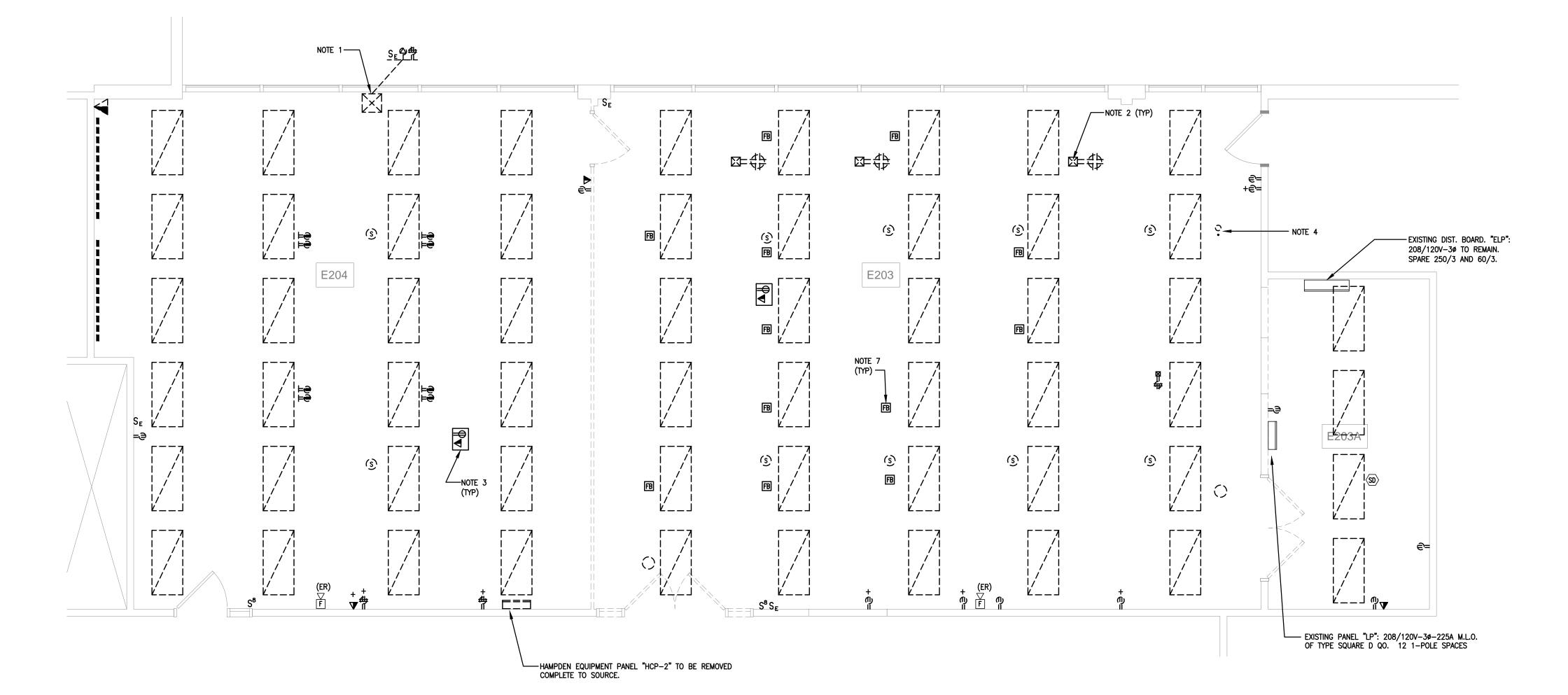


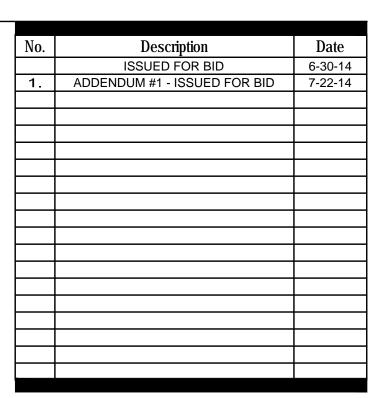
# **DEMOLITION NOTES**

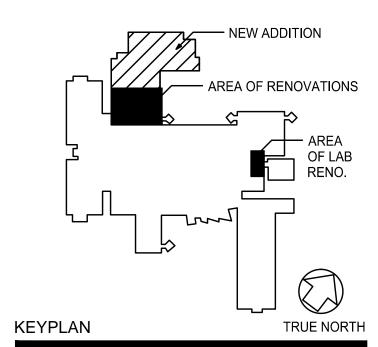
- POWER TOWER OF TYPE HAMPDEN CONTAINING THE FOLLOWING:
   (2) DUPLEX RECEPTACLES
   (1) 208/120V-3ø-4 WIRE HEAVY DUTY RECEPTACLE
   (1) GROUND PLUG
   (1) EMERGENCY SHUT OFF PUSH BUTTON
- TO BE REMOVED COMPLETE TO SOURCE.2. POWER POLE CONTAINING THE DEVICES INDICATED TO BE REMOVED COMPLETE TO SOURCE.
- CEILING MOUNTED PROJECTOR. DISCONNECT AND REMOVE UNIT AND BRACKET AND TURN OVER TO OWNER. DISCONNECT AND REMOVE EXISTING SERVICES INDICATED COMPLETE TO SOURCE.
- 4. EXISTING 1" AND 4" CONDUIT STUBBED THRU CEILING TO BE REMOVED COMPLETE TO SOURCE.5. ALL LIGHTING TO BE DISCONNECTED AND REMOVED COMPLETE. CIRCUIT ORIGINATES FROM
- PANEL "HG" IN ROOM E201/E202. CIRCUIT TO BE SAFE OFF AND REUSED. ALL LIGHTING IS 277V.
- 6. ALL FIRE ALARM DEVICES INDICATED TO BE DISCONNECTED AND REMOVED. UPON COMPLETION OF NEW WORK REINSTALL AND RECONNECT TO EXISTING WIRING. COORDINATE ALL WORK WITH OWNERS EXISTING SYSTEM LOCAL REPRESENTATIVE.
- 7. EXISTING WALKER FLOOR BOX AND HEADER DUCT. REMOVE EXISTING DEVICES AND WIRING COMPLETE. PATCH DUCTS FLUSH WITH EXISTING FLOOR WITH CONCRETE. TYPICAL FOR ALL.

# $1) \frac{\text{SECOND FLOOR - ELECTRICAL DEMOLITION PLAN}}{1/4" = 1'-0"}$

COMPLETE TO SOURCE. D BRACKET AND TURN DICATED COMPLETE TO VED COMPLETE TO SOURCE. CUIT ORIGINATES FROM REUSED. ALL LIGHTING IS NOVED. UPON COMPLETION OORDINATE ALL WORK WITH G DEVICES AND WIRING RETE. TYPICAL FOR ALL.







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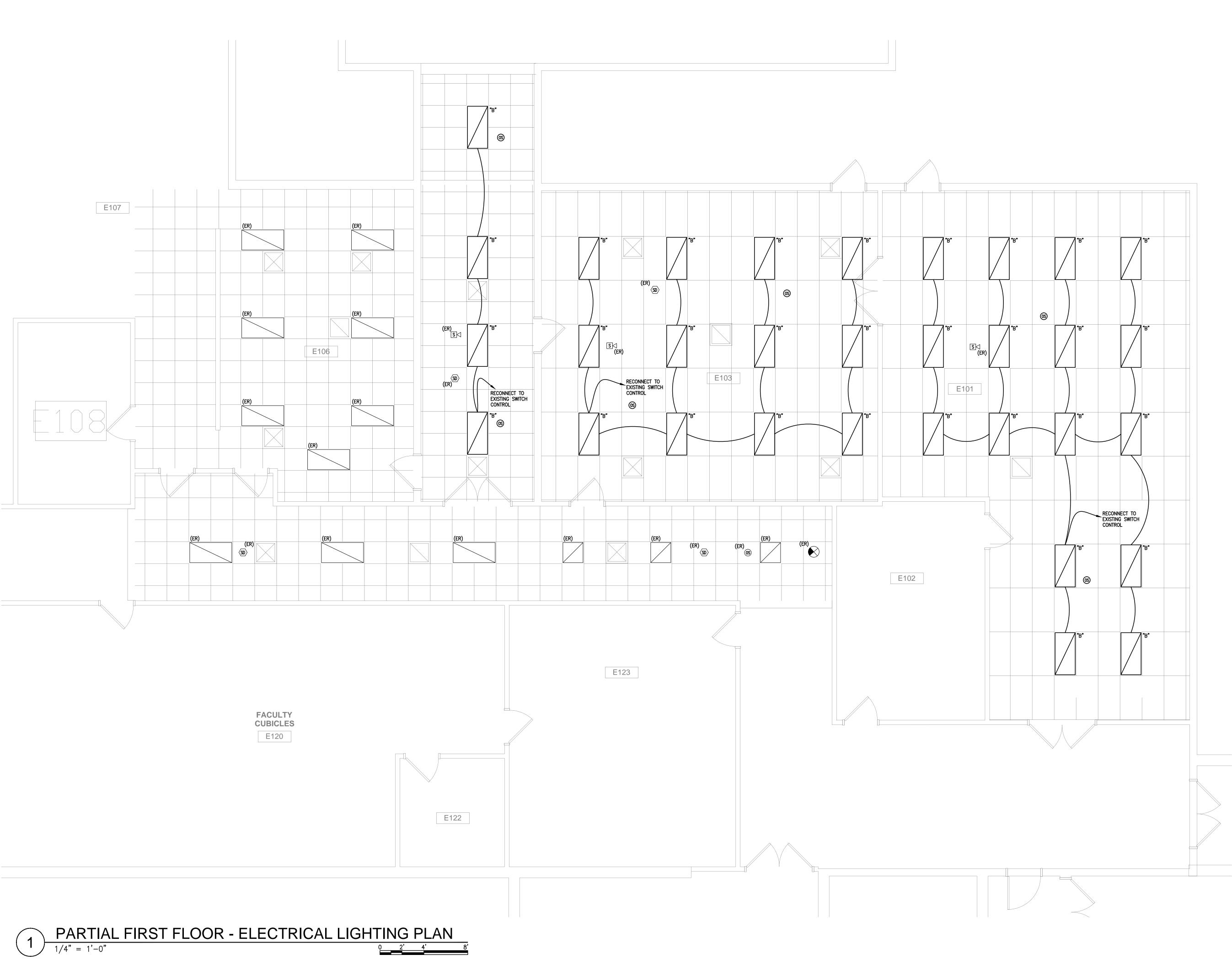
MEP

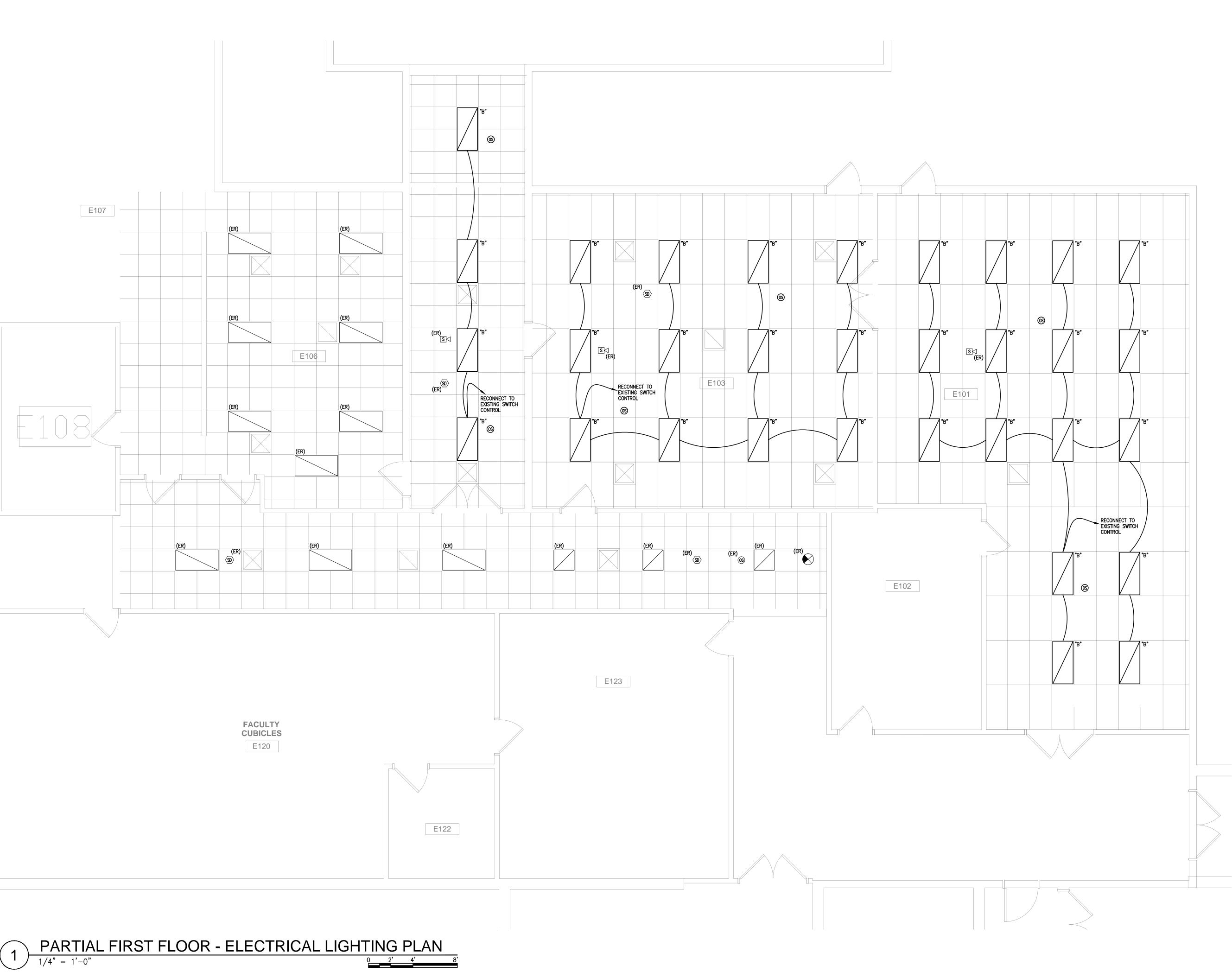
Furlow Associates 1206 Society Drive Claymont, DE 19703 302.798.3515

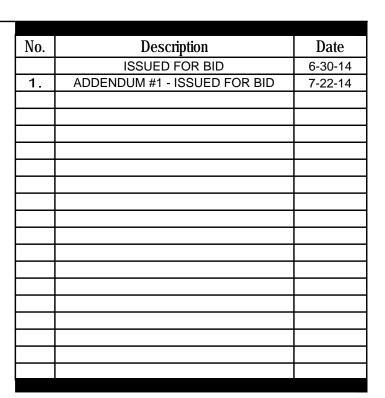
Structural Engineer MacIntosh Engineering 300 Delaware Avenue, Suite 820 Wilmington, DE 19801 302.252.9200

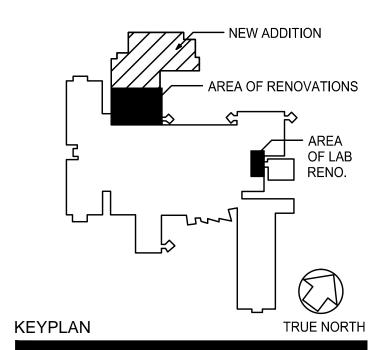








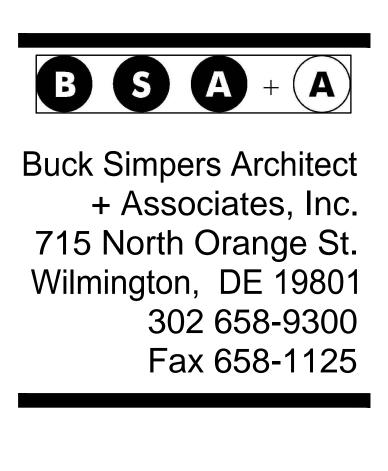




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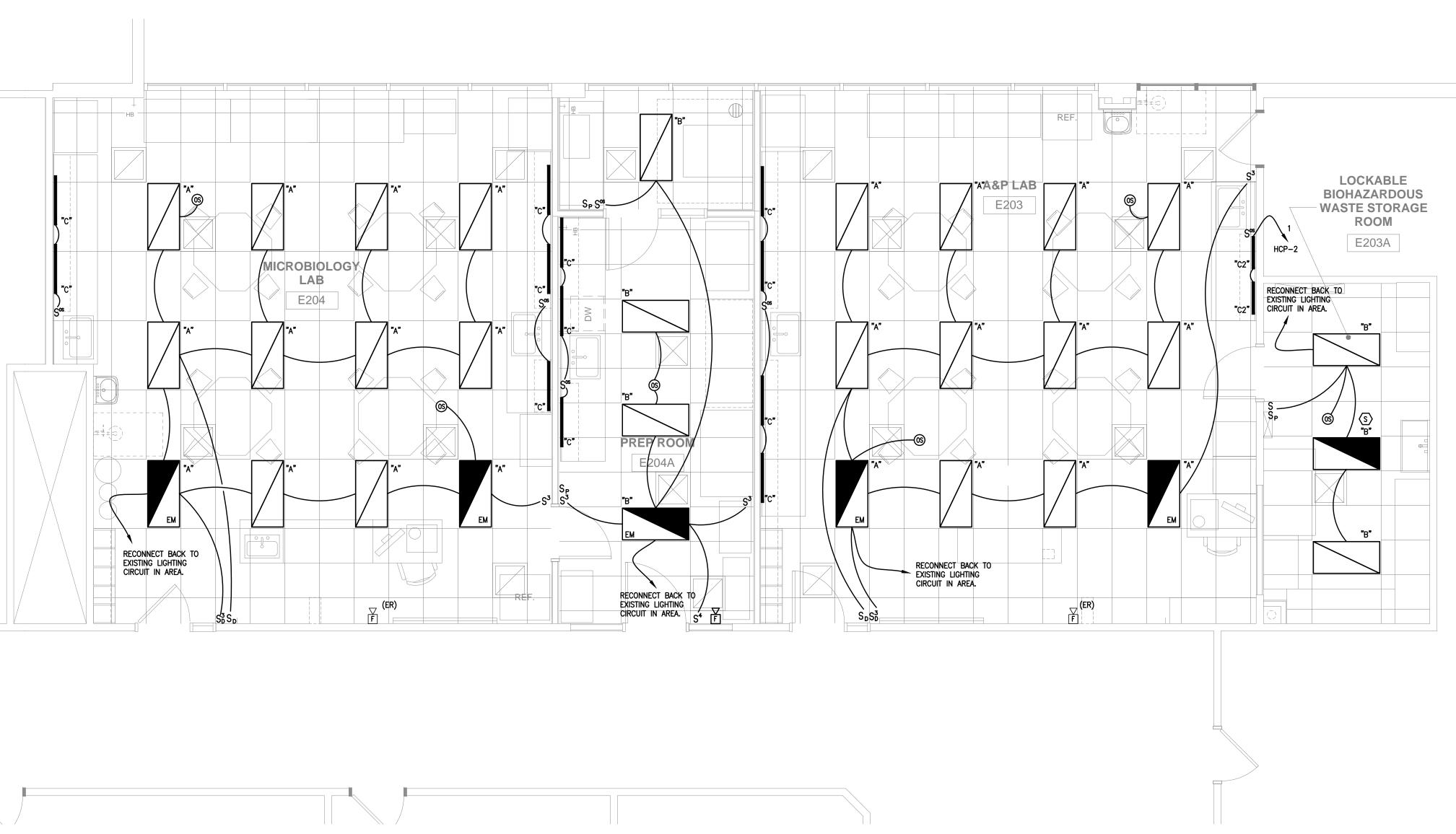
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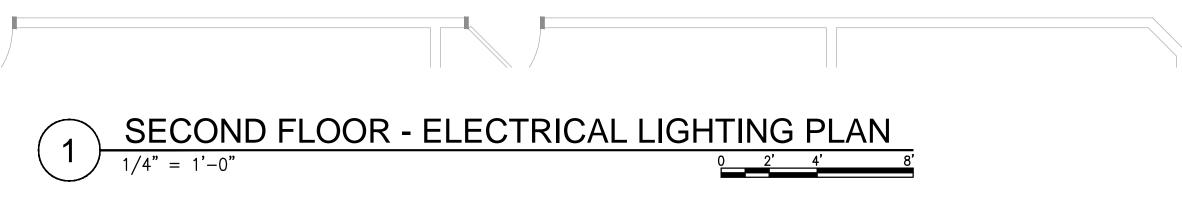




# GENERAL LIGHTING NOTES

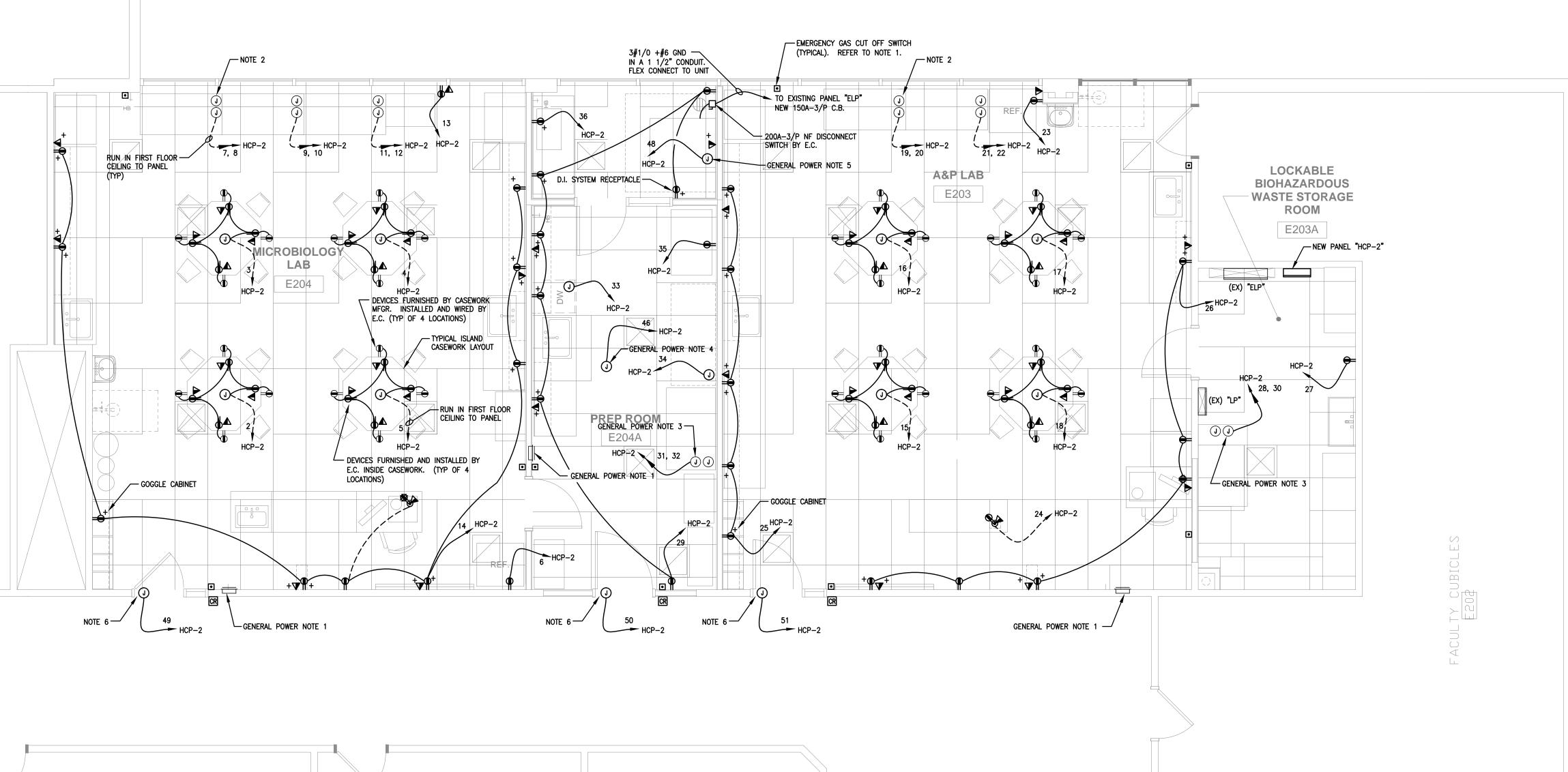
1. FIXTURES TYPE "C" AND "C2" TO BE CONNECTED TO PANEL "HCP-2" CIRCUIT #1 VIA 2#12 +#12 GND. TYPICAL FOR ALL INDICATED.



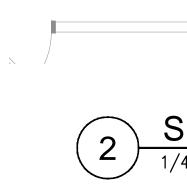


# GENERAL POWER NOTES

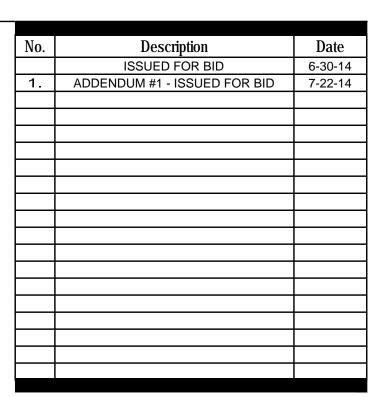
- 1. GAS SOLENOID VALVE AND CABINET FURNISHED AND INSTALLED BY P.C. E.C. RESPONSIBLE FOR ALL FINAL CONNECTIONS. REFER TO DETAIL ON SHEET E-500.
- 2. PROVIDE (2) 120V CIRCUITS TO PANEL AND CIRCUITS INDICATED VIA 2#12+#12 GND. RUN CIRCUITS IN FIRST FLOOR CEILING AND STUB UP TO EXISTING CASEWORK JUNCTION BOX LOCATED AT TOP OF UNIT. MAKE ALL FINAL CONNECTIONS TO PRE-WIRED RACEWAY MOUNTED RECEPTACLES. PROVIDE A 1" CONDUIT DOWN THRU FLOOR FOR OWNER INSTALLED DATA LINES. TYPICAL AT EACH LOCATION.
- 3. SIMILAR TO NOTE 2 EXCEPT CONDUIT DOWN FROM CEILING FOR CONNECTIONS INDICATED.
- 4. 120V CIRCUIT ABOVE CEILING FOR MECHANICAL CONTRACTORS CAV AND VAV UNITS. COORDINATE FINAL LOCATION WITH MECHANICAL CONTRACTOR.
- 120V CIRCUIT FOR PLUMBING CONTRACTORS FLOW SWITCH AND SOLENOID VALVE. COORDINATE FINAL LOCATION WITH INSTALLING CONTRACTOR. MAKE ALL FINAL CONNECTIONS. PROVIDE (2) #12 \$ (1) #12 GND TO STERILIZER CONTROL PANEL. CONNECT TO CIRCUIT/PANEL INDICATED. MAKE ALL FINAL CONNECTIONS.
- 6. PROVIDE 120V CIRCUIT ABOVE CEILING FOR DOOR HARDWARE AND CARD ACCESS POWER SUPPLIES. COORDINATE ALL WORK WITH ADVANTECH FOR REQUIRED MATERIAL AND CONNECTIONS TO CARD READER AND POWER SUPPLIES.

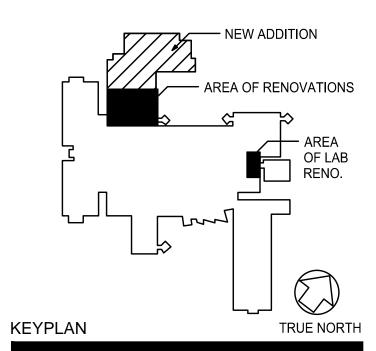






 $2 \frac{\text{SECOND FLOOR - ELECTRICAL POWER PLAN}}{1/4" = 1'-0"}$ 





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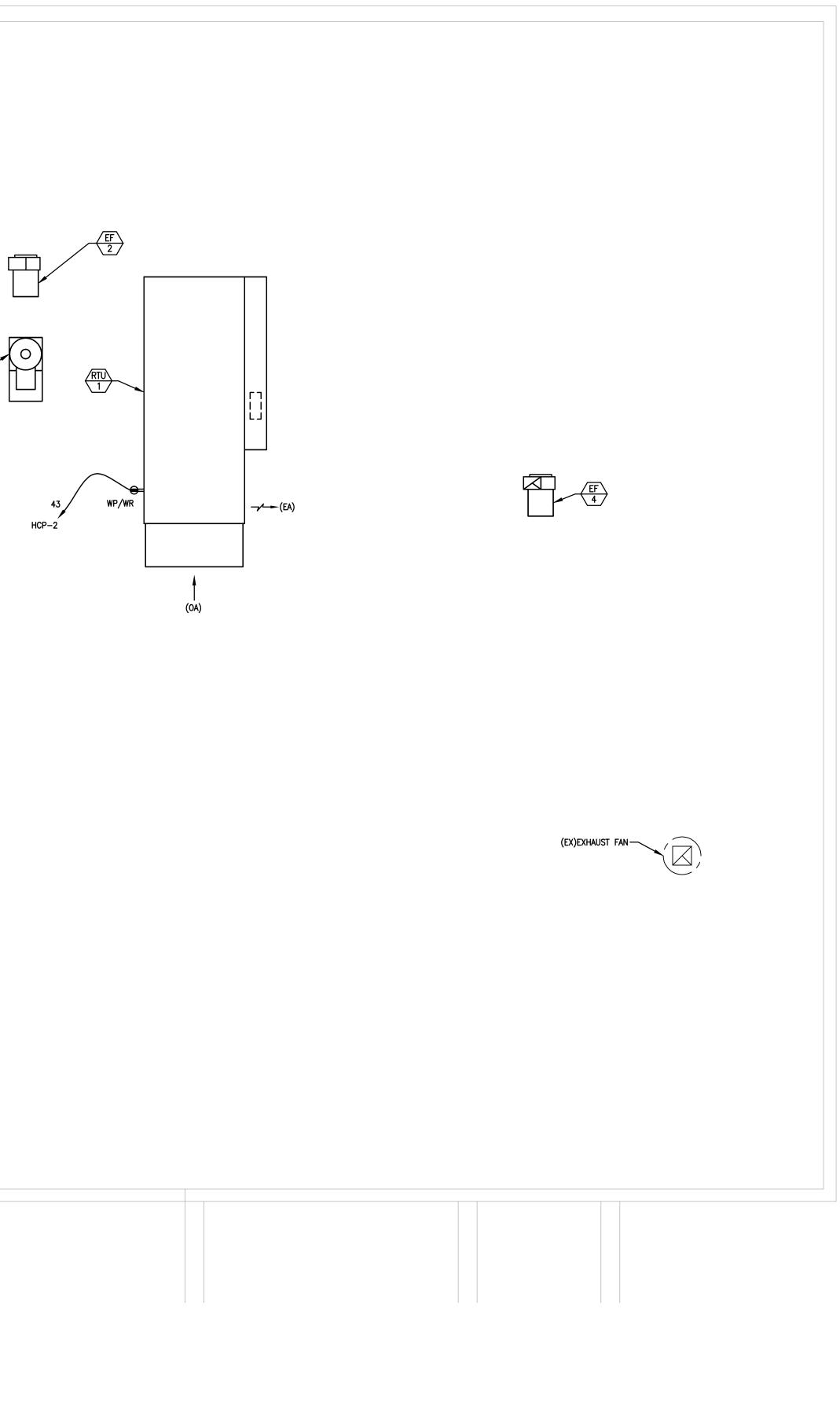


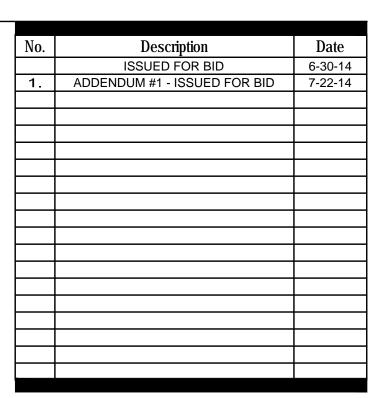


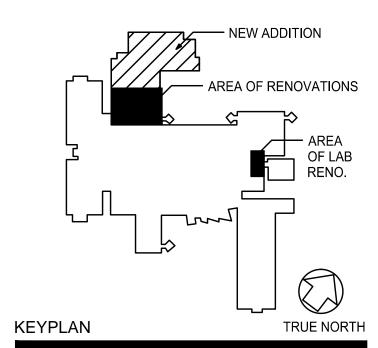




# **GENERAL SHEET NOTES:** 1. REFER TO ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT SCHEDULE ON DRAWING E-500 FOR WORK ASSOCIATED WITH ALL MECHANICAL EQUIPMENT.







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|       | YMBOL         |     | M       | ECHAN     | ICAL EQ            | UIPMENT ELECTR         | ICAL REQUIREMENTS                          |                      |         |
|-------|---------------|-----|---------|-----------|--------------------|------------------------|--|----------------------|---------|
| ITEM  | DESCRIPTION   | HP  | VOLTAGE | LOAD<br>A | CIRCUIT<br>BREAKER | WIRING                 | COMBINATION STARTER<br>AND/OR DISC. SWITCH | PANEL-CIRCUIT NUMBER | REMARKS |
| EF-1  | EXHAUST FAN   | 1/3 | 120V    | -         | 20A-1/P            | 2#12 + #12 GND: 3/4" C | WP MANUAL STARTER BY E.C.                  | HCP-2 <b>#</b> 37    | 2       |
| EF-2  | EXHAUST FAN   | 1/3 | 120V    | -         | 20A-1/P            | 2#12 + #12 GND: 3/4" C | WP MANUAL STARTER BY E.C.                  | HCP-2 <b>#</b> 39    | 2       |
| EF-3  | EXHAUST FAN   | 1   | 208V-3ø | -         | 15A-3/P            | 3#12 + #12 GND: 3/4" C | WP COMBO STARTER/DISC BY E.C.              | HCP-2 <b>#</b> 38    |         |
| EF-4  | EXHAUST FAN   | 1/3 | 120V    | -         | 20A-1/P            | 2#12 + #12 GND: 3/4" C | WP MANUAL STARTER BY E.C.                  | HCP-2 #41            | 2       |
| RTU-1 | ROOF TOP UNIT | -   | 208V-3ø | 18        | 25A-3/P            | 3#10 + #10 GND: 3/4" C | FURNISHED WITH UNIT                        | HCP-2 #43            | 1       |

NOTES:

MARSHAL OFFICE.

(1) E.C. TO PROVIDE (3) FIRE ALARM SMOKE DETECTORS TO THE MECHANICAL CONTRACTOR FOR INSTALLATION, (2-RETURN AND 1-SUPPLY). UPON COMPLETION

OF INSTALLATION CONNECT TO FIRE ALARM CONTROL PANEL AS REQUIRED FOR UNIT SHUT DOWN. ALL WORK TO BE COORDINATED WITH M.C. AND THE LOCAL FIRE

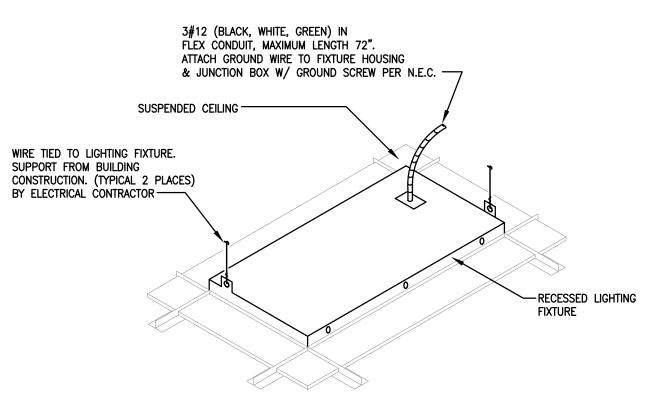
(2) E.C. TO PROVIDE TOGGLE SWITCH WITH PILOT LIGHT NEXT TO EACH LIGHT SWITCH IN ROOM FOR MANUAL OPERATION OF FAN.

# FIXTURE SCHEDULE NOTES:

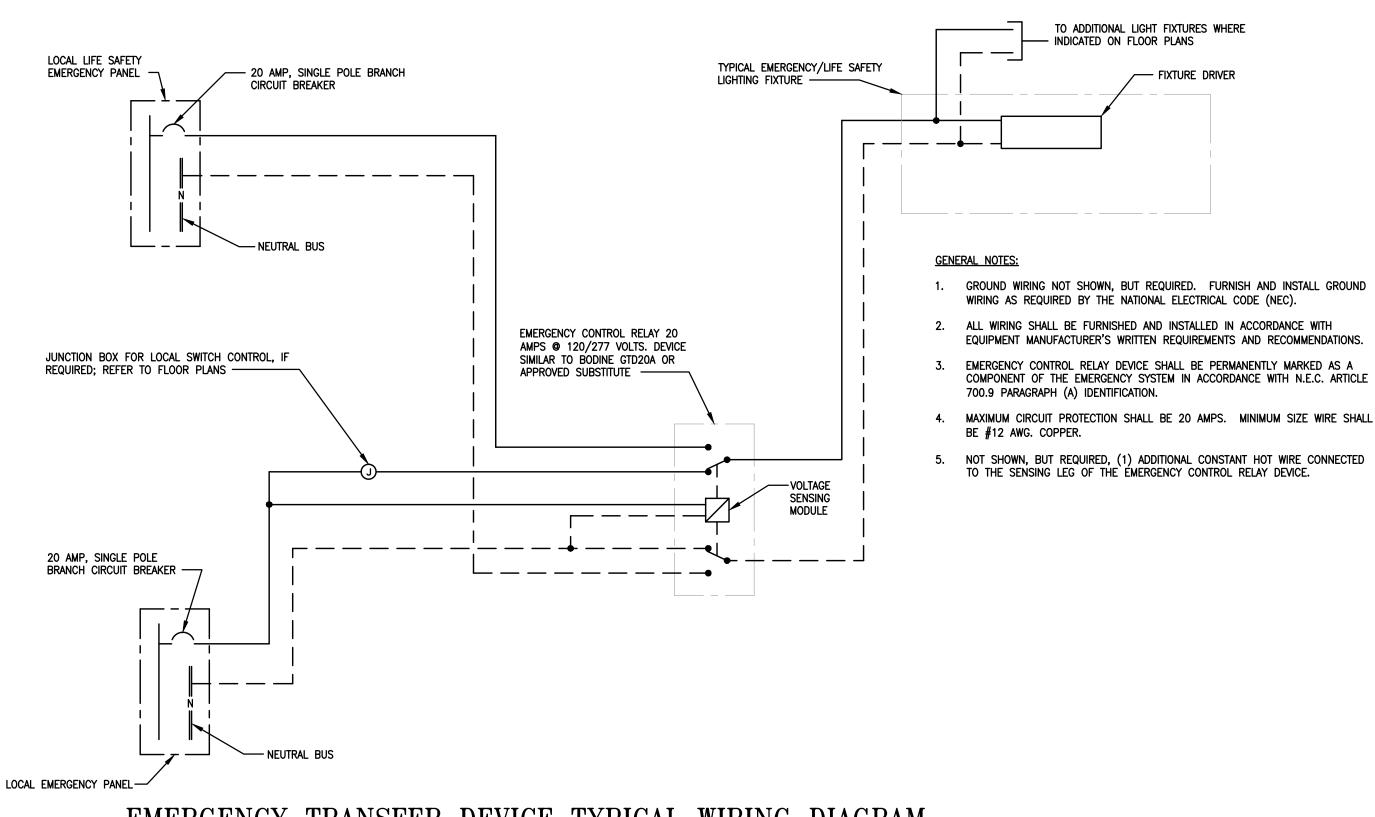
- 1. EQUIVALENT MANUFACTURERS: FIXTURES BY MANUFACTURERS LISTED AS EQUIVALENTS SHALL BE OF THE SAME TYPE, PERFORMANCE AND QUALITY OF THOSE SPECIFIED. EQUIVALENT MANUFACTURERS MUST MEET ALL CRITERIA OF THE BASE FIXTURE SPECIFIED. ANY DEVIATIONS WHICH DO NOT REFLECT THE BASE FIXTURE MAY RESULT IN A REJECTED SHOP DRAWING (DURING SUBMITTAL PERIOD). LISTED EQUIVALENTS DO NOT AUTOMATICALLY MEAN APPROVAL. NO SUBSTITUTIONS ARE TO BE MADE WITHOUT PRIOR APPROVAL. REQUEST FOR SUBSTITUTIONS SHALL BE SUBMITTED IN ACCORDANCE WITH THE SPECIFICATIONS.
- 2. ALL FIXTURE COLORS SHALL BE VERIFIED WITH THE ARCHITECT PRIOR TO APPROVAL OF SHOP DRAWINGS. 3. ALL EMERGENCY LIGHTING SHALL BE PROVIDED WITH TEST SWITCH, INTEGRAL TO FIXTURE IF POSSIBLE. IF TEST SWITCHES MUST BE SEPARATE, THEY SHALL BE MOUNTED ON A LOCAL WALL CLOSEST TO THE EMERGENCY FIXTURE, 6' A.F.F. WHEREVER POSSIBLE, TEST SWITCHES MAY BE COMBINED OR GANGED. COORDINATE FINAL LOCATIONS AND LAYOUTS OF ALL TEST SWITCHES WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION. CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND ALL FINAL CONNECTIONS.

| TYPE:<br>MFGR.:<br>CAT. <b>#</b> :<br>LAMPS:<br>MOUNTING:<br>EQUIV. MFGRS.:<br>REMARKS: | "A"<br>LITHONIA<br>2SP5-G-2-54T5HO-A12125-LUTRON-JP-16<br>(2) 54W T5HO<br>RECESSED CEILING<br>DAYBRITE, HUBBELL OR PRE-APPROVED EQUAL<br>2' WIDE x 4' LONG x 3 11/16 DEEP PREMIUM SPECIFICATION TROFFER WITH<br>COLD ROLLED STEEL HOUSING, STEEL DOOR FRAME WITH MITERED CORNERS, LIGHT SEAL, A12 PATTERN<br>.125" ACRYLIC PRISMATIC LENS, LUTRON 2-LAMP T5HO ECO-SYSTEM 1% DIMMING BALLAST, 277V.<br>PROVIDE LUTRON OCCUPANCY SENSORS, DIMMING CONTROL, POWER PACKS, CONTROL PANEL AND ALL<br>REQUIRED WIRING FOR A COMPLETE AND OPERATIONAL DIMMING SYSTEM. |
|---|---|
| TYPE:   | "B"   |
| MFGR.:  | LITHONIA  |
| CAT. #:   | 2SP5-G-2-54T5HO-A12125-MVOLT-GEB10PS-JP-16  |
| LAMPS:  | (2) 54W T5HO  |
| MOUNTING:   | RECESSED CEILING  |
| EQUIV. MFGRS.:  | DAYBRITE, HUBBELL OR PRE-APPROVED EQUAL   |
| REMARKS:  | SIMILAR TO TYPE "A" EXCEPT STANDARD ELECTRONIC BALLAST, 277V.   |
| TYPE:<br>MFGR.:<br>CAT. <b>#</b> :<br>LAMPS:<br>MOUNTING:<br>EQUIV. MFGRS.:<br>REMARKS: | "C"<br>LITHONIA<br>UC5D 21-120-LP<br>(1) 21W T5<br>UNDER CABINET<br>DAYBRITE, HUBBELL OR PRE-APPROVED EQUAL<br>1" DEEP x 2 5/8" WIDE x 34.5" LONG T5 LOW PROFILE UNDER CABINET FLUORESCENT FIXTURE WITH<br>STEEL HOUSING, WHITE FINISH, ACRYLIC WHITE DIFFUSER, STANDARD ELECTRONIC BALLAST, 120V.  |
| TYPE:   | "C2"  |
| MFGR.:  | LITHONIA  |
| CAT. #:   | UC5D 14–120–LP  |
| LAMPS:  | (1) 14W T5  |
| MOUNTING:   | UNDER CABINET   |
| EQUIV. MFGRS.:  | DAYBRITE, HUBBELL OR PRE–APPROVED EQUAL   |
| REMARKS:  | SIMILAR TO TYPE "C" EXCEPT 23 3/4" LONG AND 14W T5 LAMP.  |

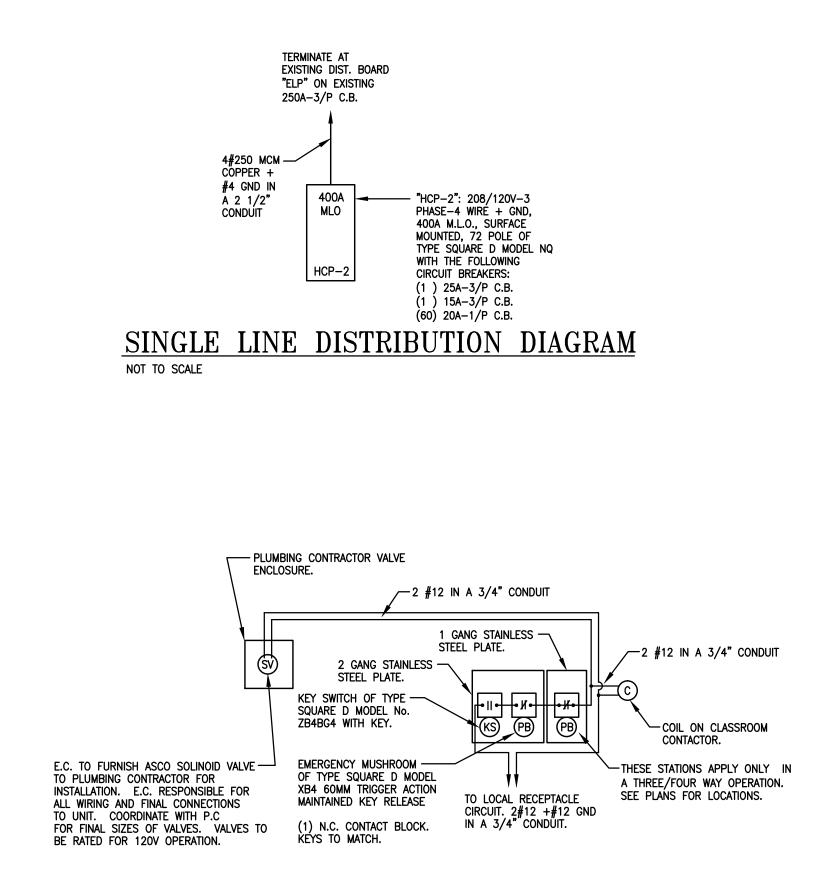




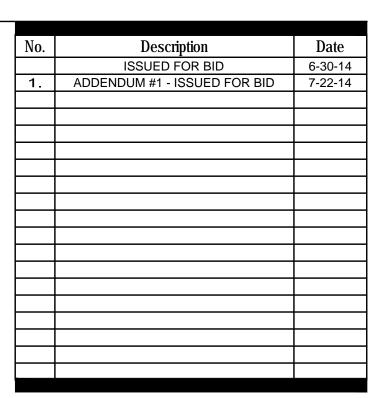


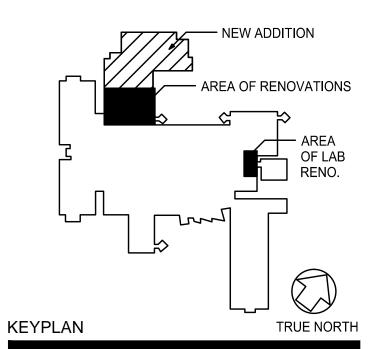


EMERGENCY TRANSFER DEVICE TYPICAL WIRING DIAGRAM NOT TO SCALE









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# ALLIED HEALTH – E WING LAB RENOVATION

Page 1

**Contractor Requests For Information** 

| ITEM | Q & A  | DATE     | ISSUED   | Answered<br>By |
|------|--|----------|----------|----------------|
| Q1   | The summary of work 7.1.8 states that contractor is to Furnish and install ADA compliant dishwasher, P500 F-9 in schedule states it is provided by owner, please               | 07/17/14 | ADDEN #1 |                |
| A 1  | clarify.   | 07/01/14 |          |                |
| A1   | P500 F-9 as written is correct. F-9 to be provided by owner.   | 07/21/14 | ADDEN #1 | Bancroft       |
| Q2   | There is no specification for the compressed air piping, please clarify.   | 07/17/14 | ADDEN #1 |                |
| A2   | Pipe-ASTM A-53, Fittings. Malleable Iron ASAB16.3, Ball valves.  |          |          | Furlow         |
| Q3   | F-19 Deionized Water Generator, there is no specification and it is not located on the drawings, please clarify.   | 07/17/14 | ADDEN #1 |                |
| A3   | D1 system specification on plumbing schedule (P-500) F-19 is located on Drawing P200, adjacent to sterilization.   |          |          | Furlow         |
| Q4   | There is a spec for acoustical duct liner but I could not find where it is required. Is it required? Is the Roof top acoustical package required along with Sound Attenuators? | 07/17/14 | ADDEN #1 |                |
| A4   | Supply & Return duct from unit to sound attenuators to be lined. Yes, rooftop acoustical package is required.  |          |          | Furlow         |
| Q5   | 123553 states epoxy resin sinks and counters. Plumbing schedule shows stainless steel sinks. Please advise.  | 07/17/14 | ADDEN #1 |                |
| A5   | P-500 schedule states: SINK PROVIED WITH COUNTERTOP  |          |          | Furlow         |
| Q6   | Please verify that the 30" x 48" desk in room E203 is supplied by the owner.   | 07/17/14 | ADDEN #1 |                |
| A6   | Yes this is supplied by the owner and purchased under FFE.   | 07/21/14 |          | BSA+A          |
| Q7   | Please verify that the 6' benchtop in room E204B is supplied by the owner.   | 07/17/14 | ADDEN #1 |                |
| A7   | Yes this is supplied by the owner and purchased under FFE.   | 07/21/14 |          | BSA+A          |
| Q8   | Please verify that all stools typical to the lab work benches are not part of 123553.  | 07/17/14 | ADDEN #1 |                |
| A8   | Correct  | 07/21/14 |          | BSA+A          |
| Q9   | Is the casework portion of this project to be bid as a Prime Contract?   | 07/17/14 | ADDEN #1 |                |
| A9   | Laboratory casework is being letter bid as a Prime Contract by invite only.  | 07/21/14 |          | Bancroft       |
| Q10  | REQUEST FOR SUBSTITUTION SPEC SECTION: Section 230760  | 07/18/14 | ADDEN #1 |                |
| A10  | The request for Renew-Aire is approved.  |          |          | Furlow         |
| Q11  | Do the existing walls extended to the underside of the deck?   | 07/18/14 | ADDEN #1 |                |



## ALLIED HEALTH – E WING LAB RENOVATION Page 2

# **Contractor Requests For Information**

|   | ITEM | Q & A  | DATE     | ISSUED | Answered<br>By |
|---|------|--|----------|--------|----------------|
| - | A11  | Some may. All need to be verified in the field and if they do not, they will need to be extended to the underside of the deck. | 07/21/14 |        | BSA+A          |

## Pre-Bid Meeting Agenda 07-08-2014

# Delaware Technical & Community College Allied Health E Wing Lab Renovation

# Plumbing, Mechanical, and ATC Bid Package

| Introductions: | Delaware Tech  |
|----------------|--|
|                | Bancroft Const   |
|                | $\mathbf{DCA} + \mathbf{A} / \mathbf{D}_{\text{real}}$ |

Delaware Technical & Community College Bancroft Construction Company BSA+A / Buck Simpers Architects + Associates, Inc. Furlow Associates

- 1. Project Overview & Alternates (BSA+A)
- 2. Review Invitation to Bid & Pre-Bid Meeting Handout (Bancroft)
- 3. Bid Forms & Subcontractor List (Bancroft)
- 4. Project Schedule Review (Review of Milestone Dates from Master Schedule)
- 5. Question / Answer Session
- 6. Site Tour (If Applicable)

### PRE-BID MEETING HANDOUT

| DATE:                | July 8, 2014<br>2:00 pm  |
|----------------------|--|
| MEETING<br>LOCATION: | Delaware Technical & Community College<br>Conference Center Rm A116<br>400 Stanton-Christiana Road<br>Newark, DE 19713 |
| PROJECT<br>LOCATION: | Delaware Technical & Community College<br>Stanton Campus<br>400 Stanton-Christiana Road<br>Newark, DE 19713            |
| RE:                  | Non-Mandatory Pre-Bid Meeting<br>Plumbing, Mechanical, and ATC Bid Package   |

- 1. Please sign-in. A sign in sheet has been provided and we ask that all in attendance please sign in and provide the information requested.
- 2. Bid Documents will be available for inspection at Bancroft Construction Company, 1300 Grant Ave., Wilmington, DE. 19806.
- 3. Bid Documents are available at Reprographics Center, Inc. (RCI), 298 Churchmans Road, New Castle, DE 19720. RCI's phone number is 302-328-5019.
- 4. Bid Documents may be downloaded at <u>ftp://ftp.bancroftusa.com</u> with user name: ewingftp1 (not case sensitive) and password: Bancroft#1 (case sensitive). You must use your Operating System (Windows) address bar to access an FTP site. Using your web browser (Internet Explorer, Safari, Firefox, etc.) will not work.
- 5. The Bid Opening is scheduled for 2:00pm on July 28th, 2014. Bids must be address to "DTCC, Department of Administrative Services, Delaware Technical & Community College, Stanton Campus, Newark, Delaware". Bids shall be received at the Conference Center Rm A116 up until the time of the bid opening. Two (2) copies of bids must be submitted. Each Bid must be accompanied by a bid security equivalent to ten percent (10%) of the bid amount and all additive alternates. Each Bid Form is inclusive of the following as attachments: Sub-Contractor List; Non-Collusion Statement; Bid Security; Consent of Surety.
- 6. Questions may be e-mailed to Kevin Mueller at kmueller@bancroftusa.com. All questions must be submitted by 2:00 PM on Friday, July 18st, 2014. Questions received by the deadline will be answered by Tuesday, July 22nd, 2014. Upon receipt of such notice, all bidders will be furnished additional information as necessary to make bidding uniform. Bancroft Construction Company will not be responsible for any oral instructions.
- 7. Addendum # 1 will contain pre-bid meeting minutes and any other supplemental information and clarifications.
- 8. Attendees are directed to the "Instruction for Bidders" included in the specifications. These instructions should be read and followed carefully. Title 29 does not allow for

exclusion or exceptions. Complete the Bid Form accurately so bids don't have to be rejected.

- 9. Pay particular attention to the Bancroft Construction Company Site and Special Conditions that are part of the contract documents. Bancroft is the Construction Manager for all contractors and safety requirements are to be met by all jobsite contractors. The project is on a fully operational high-education campus and all contractors must be considerate of the students, faculty and all other building occupants.
- 10. This is a State of Delaware Prevailing Wage Rate project. PREVAILING WAGES FOR **BUILDING CONSTRUCTION** EFFECTIVE MARCH 14, 2014.
- 11. A Bid Bond of 10% of the bid amount, including all Alternates, is required with the Bid. The Bid Bond or other forms as described in the "Instruction for Bidders". In addition to a Bid Bond, the successful bidder that is awarded the contract for this bid package will be required to submit Performance and Payment Bonds (100% of the contract amount).
- 12. Per Title 29 Regulations, the Subcontractors List must be filled-out and included with the Bid. "The name and address of the sub-contractor must be listed for each category, as agreed to in the Pre-Bid meeting, where the bidder intends to use a sub-contractor to perform that category of work." At this meeting, the bidders are to agree to a list of subcontractor "categories." Or the bidders can agree to not list any 'categories" or subcontractors at all. Bidders must list themselves as being the subcontractor if they intend to perform the category of work. The Prime Contractor must perform a minimum 35% of the required work with their own work force.
- 13. The Bidder and all of the subcontractors must have a valid Delaware Business License, and any Local Licenses or must have applied and paid for such license prior to submitting the Bid.
- 14. The Contractor is responsible for obtaining and paying for all permits/notifications required by Federal, State and Local authorities. Bancroft will obtain the New Castle County building permit only.
- 15. All addenda will be posted by Bancroft Construction to all bidders.
- 16. After the Bid opening, the apparent low bidder must attend a Bid Clarification Meeting, subsequent to receipt of bids, the exact time and location shall be determined.
- 17. Contracts will be awarded directly to the successful contractor by Delaware Technical & Community College / State of Delaware. Payments will be made by Delaware Technical & Community College / State of Delaware.
- 18. Contractors must adhere to schedule listed in bid package specifications.

#### Event

#### **Milestone**

Start Construction Complete Construction (C of O) September 25th, 2014 March 2<sup>nd</sup>, 2015



# **Meeting Minutes**

Bancroft

| Date      | Start                                       | End  | Next Meeting  | Next Time  | Prepared By   | Company                           |              |
|-----------|---|--|---|--|---|-----------------------------------|--------------|
| 7/8/2014  | 02:00 PM                                    | 03:40 PM   |   |  | Kevin Mueller   | Bancroft Construction             | Company      |
| Purpose   |   |  | Location  | Nex  | t Location  | General Notes                     |              |
|           | atory Pre-Bid to<br>the project an<br>ts    |  | Delaware Technica<br>Communit College<br>Conference Center<br>Stanton Campus<br>400 Stanton-Christi<br>Newark, DE 19713 | Rm A116 -  |   | Attendance was not a for bidding. | prerequisite |
| Attended  | Ву  |  |   | Non-   | Attendees   |                                   |              |
| ltem Mee  | ting Item De                                | escription                                       |   |  |   | Resp                              | Cls'd        |
| New Bus   | ness  |  |   |  |   |                                   |              |
| Introduct | ion   |  |   |  |   |                                   |              |
| 001-001   | Kevin Muelle                                | r confirmed t                                    |   |  | team and identified th<br>atory and for the Plum  |                                   | No           |
| Project O | verview                                     |  |   |  |   |                                   |              |
| 001-002   |   |  | SA+A provided a proj<br>verview of the Mecha  |  | irley Johnson with Fu<br>Ind ATC systems.   | rlow                              | No           |
| Contract  | Requiremen                                  | its  |   |  |   |                                   |              |
| 001-003   | A101 - 2007,                                | Standard for                                     | m of Agreement betw   | een Owner and (  | d package will be AIA<br>Contractor where the I<br>onstruction is the CM f  | pasis of                          | No           |
| FTP / Doo | ument Acce                                  | ess  |   |  |   |                                   |              |
| 001-004   | site address<br>advertisemer<br>documents a | was ftp://ftp.b<br>nt was incorre<br>ind addenda | encroftusa.com. Kev<br>ect. Kevin Mueller de  | in Mueller stated<br>tailed how to acc<br>as clarified that th | genda Handout and cl<br>the ftp address on the<br>ess the ftp site where<br>e bidders shall bear th<br>r addenda. | e bid<br>all bid                  | No           |
| Bid Form  | & Subcontr                                  | actor List                                       |   |  |   |                                   |              |
| 001-005   | were reviewe                                | ed and decide                                    | ed upon. The Bid Forr   | n page containing  | or categories for the b<br>g the Subcontract List<br>categories are repeate                                       | shall be                          | No           |
| Schedule  | Milestone F                                 | Review   |   |  |   |                                   |              |
| 001-006   |   |  |   |  | verview highlighting the termittent phases and  |                                   | No           |
| Alternate | for Fire Ala                                | rm Contrac                                       | tor   |  |   |                                   |              |
|           | ager  | Printed on: 7                                    | 7/21/2014 Corpora   | to.  |   |                                   | Page 1       |



| Item Me  | eting Item Description   |                            |                   |           | Resp | Cls'd |
|----------|--|----------------------------|-------------------|-----------|------|-------|
| New Bus  | siness   |                            |                   |           |      |       |
| 001-007  | Kevin Mueller with Bancroft clarified that the fire alarm subcontractor was not included in the scope of the Plumbing, Mechanical, and ATC Bid Package, but the bid form contains a place to complete the alternate if necessary. Bidder to write zero dollars if no bid change for the alternate. |                            |                   | No        |      |       |
| Site Wal | k  |                            |                   |           |      |       |
| 001-008  | A site walk followed the pre bid   | meeting to review the exis | ting project area | (E-Wing). |      | No    |
|          |  |                            |                   |           |      |       |
| Cc: Co   | mpany Name   | Contact Name               | Copies            | Notes     |      |       |

Meeting Minutes shall be captured in addendum #1

## ALLIED HEALTH E-WING LAB RENOVATIONS PRE BID MEETING ATTENDANCE: July 8, 2014

## SIGH IN SHEET FOR: Plumbing, Mechanical, and ATC Bid Package

| Your Name, Phone & Fax                   | Company Name & Full Address         |
|--|-------------------------------------|
| José WAYBRIGHT                           | EAST CONST PLUMBING \$ HUAC         |
| PH: 3-2-26-6530 x1, 104                  | 26 A BROOKHI PRIVE                  |
| FAX: 302-266- 0532                       | Newmark, DE 19702                   |
| E-Mail: JOSE CECPH.NET                   | Prime Contractor or Sub             |
| Your Name, Phone & Fax                   | Company Name & Full Address         |
| Ken VANDegrift                           | C+D Contractors                     |
| PH: 302-764 8013                         | 14 E 45Th ST                        |
| FAX: 764-7585                            | Wilm De 19802                       |
| E-Mail: KVANDegrift. cd@ verizon. Net    | - Prime Contractor or Sub           |
| Your Name, Phone & Fax                   | Company Name & Full Address         |
| DAVE RAGULIA                             | CNCS- MECH                          |
| PH: 302-883-3104                         | 509 HATCHERY RD                     |
| FAX: 302-883-3194                        | DOURR DE 19901                      |
| DAVID, RAGULIAC CHEROKEE - CA<br>E-Mail: | VCS, COM<br>Prime Contractor or Sub |
| Your Name, Phone & Fax                   | Company Name & Full Address         |
| ROB SHARP                                | Superior Electric                   |
| PH: 302-658-5949                         | 36 GIERMAY DR.                      |
| FAX: 302 - 658 - 5983                    | WilminterTON, DE                    |
| E-Mail: robersuperorelectric. b.z        | Prime Contractor or Sub             |

36 GIERMAY DR. WILMINGTON, DE

Page \_\_\_\_ of \_\_\_\_

# ALLIED HEALTH E-WING LAB RENOVATIONS PRE BID MEETING ATTENDANCE: July 8, 2014

## SIGH IN SHEET FOR: Plumbing, Mechanical, and ATC Bid Package

| Your Name, Phone & Fax  | Company Name & Full Address   |  |  |
|---|---|--|--|
| Shirley Johnson   | Furlow Associates   |  |  |
| PH: 302-798-3515  | 1206 Society Dr.  |  |  |
| FAX:  | Claymont, TDE 19703   |  |  |
| E-Mail:And pulouassociates co   | Prime Contractor or Sub   |  |  |
| Your Name, Phone & Fax  | Company Name & Full Address   |  |  |
| BRIAN SMITTH  | BSS Contractors   |  |  |
| PH: 610-345-1316  | 281 E Evergreen St.   |  |  |
| FAX: 610 - 345 - 1318   | West Grie PA 19320  |  |  |
| E-Mail: bsnith@bsscontactor.com   | Prime Contractor or Sub <u>6C</u>   |  |  |
|   |   |  |  |
| Your Name, Phone & Fax  | Company Name & Full Address   |  |  |
| Your Name, Phone & Fax<br>Tolu Verissimo  | Company Name & Full Address   |  |  |
|   |   |  |  |
| Tolu Venissimo  | Bristol Ind.  |  |  |
| Tolu Verissimo<br>PH: 302-824-3188  | Briston Ind.<br>1010 hurrer hard Mewlastel  |  |  |
| Tolu Verissimo<br>PH: 302-824-3188<br>FAX:  | Briston Ind.<br>1010 hurrer hard Newlessfel<br>DE 19720   |  |  |
| Tolu Verissimo<br>PH: 302-824-3188<br>FAX:<br>E-Mail: <u>teverisisegmal.com</u>   | Bristor Ind.<br>1010 hurrer hard Mewlastel<br>DE 19720<br>Prime Contractor or Sub   |  |  |
| Tolu Verissimo<br>PH: 302-824-3188<br>FAX:<br>E-Mail: teverisisegmal.com<br>Your Name, Phone & Fax                              | Bristol Indi<br>1010 huver hard Mewlastel<br>DE 19720<br>Prime Contractor or Sub<br>Company Name & Full Address                 |  |  |
| Tolu Verissimo<br>PH: 302-824-3188<br>FAX:<br>E-Mail: <u>teverisisegmail.com</u><br>Your Name, Phone & Fax<br><u>Eron Eboda</u> | Bristol Ind.<br>1010 hurer hard Mewlastel<br>DE 19720<br>Prime Contractor or Sub<br>Company Name & Full Address<br>Bristol Ind. |  |  |

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