# Office of Procurement & Contracting Notice of Intent to Award



**RE:** Notice of Intent to Award

Project Title: IFB 22-20 HVAC Renovations: Building 70

Date: January 10, 2022

Dear Vendors,

This letter serves as Stockton University's Notice of Intent to Award for *IFB 22-20 HVAC Renovations: Building 70* to the following firm in the amount listed below:

Surety Mechanical Services of NJ, LLC

Williamstown, NJ

**Lump-Sum Base Bid** 

\$833,500.00

This notification is based on the apparent lowest cost responsible firm and shall be effective for three (3) business days, subject to receipt of any protests and additional forms as required by the project documents.

Stockton University appreciates your time and effort submitting a response to this offering and welcomes your continued interest in future opportunities.

Robert Yufer
Procurement Manager
Robert.Yufer@stockton.edu

Office of Procurement & Contracting (Upper N-Wing) 101 Vera King Farris Drive Galloway, NJ 08205-9441 609.652.4698



# CONTRACT FOR CONSTRUCTION

This Agreement made as of January 21, 2022, between Stockton University (the "Owner") as the project owner, and Surety Mechanical Services of NJ, LLC (the "Contractor") as the General Contractor.

Contractor:

Surety Mechanical Services of NJ, LLC

Address:

300 Thomas Avenue, Suite 201

Williamstown, NJ 08094

Project:

HVAC Renovations: Building 70

Stockton University, Galloway, NJ

Bid IFB 22-20

- EMPLOYMENT OF CONTRACTOR/PROJECT DESCRIPTION. The Owner employs the Contractor and the Contractor agrees to perform all obligations described in the Contract Documents (as defined herein) as required in connection with the construction of the project identified above (the "Project").
- 2. CONTRACT DOCUMENTS. The Contract evidenced by this Agreement includes and incorporates by reference the Contract Documents, as follows:
  - a. General Conditions for Construction dated 5/23/16
  - b. Bid Solicitation dated 11/22/2022
  - c. Technical Specifications
  - d. Supplementary General Conditions dated 11/2021
  - e. Drawings dated 10/28/2021
  - f. Addendum #1 dated 12/09/2021
  - g. Safety Manual dated 3/26/15
  - h. Contractor's Bid dated 12/21/2021
  - i. Applicable Prevailing Wage Rates Determined by N.J. Department of Labor
  - j. This Agreement
- 3. PROJECT PARTICIPANTS. The following have been designated or retained by the Owner as project participants:

#### 3.1. Contractor;

Firm Name:

Surety Mechanical Services of NJ, LLC

Address:

300 Thomas Avenue, Suite 201

Williamstown, NJ 08094

3.2. Contracting Officer: Francis Saffioti
Title: Secretary/Treasurer

- 4. CONTRACT PRICE. The Contractor shall be paid \$833,500 (the "Contract Price") for the complete performance of the Contract, in accordance with the payment provisions set forth in the Contract Documents.
- 5. SCOPE OF WORK. The Contractor shall perform all Work and satisfy all other obligations described in the Contract Documents. The Contractor shall assume full responsibility for constructing and completing the Work described in the Contract Documents, including providing all labor, subcontractors, services, materials and equipment required, and providing all supervision, management, and scheduling required in the Contract Documents.
- 6. CONTRACT TIMES. It is agreed that Time is of the Essence for all dates and durations specified for the start of construction and the substantial completion and final completion of the Project.
- 7. CONSTRUCTION START. The Work shall commence on the project site on or about February 21, 2022.
- 8. MILESTONES. The following construction tasks or activities shall be completed within the following number of calendar days after the Owner issues the Notice to Proceed.

Activity	Calendar Days
Notice to Proceed	February 14, 2022
Substantial Completion	190 days from Notice to Proceed
Final Completion	20 calendar days from substantial completion date

9. FINAL COMPLETION. It is agreed that all work performed pursuant to this Contract and all contractual obligations of the Contractor shall be finally completed by September 12, 2022. All requirements for final completion are set forth in the Contract Documents.

#### 10. NOTICES:

**Notice to the Contractor:** Written notices required to be given to the Contractor under this contract shall be addressed to:

Francis Saffioti Secretary/Treasurer Surety Mechanical Services of NJ, LLC 300 Thomas Avenue, Suite 201 Williamstown, NJ 08094

Notice to the Owner: Written notices required to be given to the Owner under this Contract shall be addressed to:

Charles West Stockton University 101 Vera King Farris Drive Galloway, NJ 08205

- 11. CONTRACT TERMS, CHANGES, AND LAW: This Agreement and the Contract Documents incorporated by reference herein constitutes the entire agreement between the Owner and the Contractor, and shall be governed by the laws of the State of New Jersey, including, without limitation, the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1, et seq., including the notice and time of suit provisions of the Act. The terms and conditions of this Contract may not be changed except by a writing signed by duly-authorized representatives of the Contractor and the Owner.
- 12. PREVAILING WAGE STATUTE. The Contractor and all subcontractors must Comply with the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.25 et seq., and the regulations promulgated thereunder. Workers employed by the Contractor or any subcontractor or sub-subcontractor in the performance of services directly on the Project must be paid prevailing wages at the applicable rates as determined by the N.J. Department of Labor, which rates are set forth in the Contract Documents and incorporated herein by reference. As provided by N.J.S.A. 34:11-56.27, the Contractor or any subcontractor may be terminated if any covered worker is not paid the applicable prevailing wages on the Project, and the Contractor and its surety shall be liable to the Owner for any additional costs which result therefrom. The Contractor is advised that the applicable wage rates may change over the life of the Contract, and that payments by the Contractor and all subcontractors to all covered workers shall be in accordance with any rate changes instituted over the life of the Contract. The Contractor shall regularly consult the New Jersey Department of Labor's Prevailing Wage Website. http://lwd.dol.state.nj.us/labor/wagehour/wagerate/prevailing\_wage\_determinations.html for changes to prevailing wage rates.
- 13. DISCRIMINATION IN EMPLOYMENT. The Contractor and any subcontractors employed by it shall comply with N.J.S.A. 10:2-1 through 10:2-4 and N.J.S.A. 10:5-1 et seq., including N.J.S.A. 10:5-31 through 35, which prohibit discrimination in employment in public contracts. The statute and the rules and regulations promulgated thereunder shall be considered to be part of this Contract and binding upon the Contractor and its subcontractors. If the Owner is notified of any violation of the public contract awarding regulations in accordance with N.J.A.C. 17:27-7.4 concerning the financing of minority

and women outreach and training programs, the Owner reserves the right to deduct the outreach and training allocation from the contract. During the performance of this Contract, the Contractor agrees that:

DISCRIMINATION: It shall not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status or sex. The Contractor shall take affirmative action to ensure that such applicants are recruited and employed, and that employees are treated during employment without regard to their age, race, creed, color, national origin, ancestry, marital status or sex. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising, layoff or termination rate 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 setting forth the provisions of this non-discrimination clause.

**ADVERTISEMENTS:** The Contractor shall, in all solicitations or advertisements for employees, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status or sex.

NOTICES: The Contractor shall send to each labor union or representative of workers with which it has collective bargaining agreement or other contract or understanding a notice advising the labor union or workers' representative of the Contractor's commitment, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

HANDICAP: The Contractor shall comply with N.J.S.A. 10:5-4.1 which prohibits any unlawful discrimination against any person because of physical handicap, or any unlawful employment practice against such a person unless the nature and the extent of the handicap necessarily precludes the performance of the particular employment duties.

14. COMPLIANCE WITH PROCUREMENT STATUTES: The Contractor warrants and represents that this Contract has not been solicited or secured, directly or indirectly, in a manner contrary to the laws of the State of New Jersey, and in particular the provisions of N.J.S.A. 18A:64-6.1,6.2 and 6.3, and that the Contractor has not and shall not violate the laws of the State of New Jersey relating to the procurement of or the performance of this Contract by any conduct, including the paying of any gratuity of any kind, directly or indirectly, to any public employee or officer. Any violation of this provision shall be cause for the Owner to terminate this Contract, to retain all unpaid and/or unearned monies, and to recover all monies paid. The Contractor shall notify the Owner in writing of any interest which any officer, employee or consultant of the Owner has in, or association with, any contractor, subcontractor, material supplier, consultant, or manufacturer, or other party which has any interest in this Project.

#### 15. SET-OFF FOR STATE TAX

Please be advised that, pursuant to P.L. 1995, c. 159, effective January 1, 1996 and codified as N.J.S.A. 54:49-19 and N.J.S.A. 54:49-20, and notwithstanding any provision of the law to the contrary, whenever any taxpayer, partnership or S Corporation under contract to provide goods or services or construction projects to the State of New Jersey or its agencies or instrumentalities, including the legislative and judicial branches of State government, is entitled to payment for those goods and services or construction projects, at the same time a taxpayer, partner or shareholder of that entity is indebted for any State tax, which pursuant to N.J.S.A. 43:21-14.4 also included any indebtedness greater than or equal to \$300 that is due to the Unemployment Compensation Fund, the State Disability Benefits Fund, and the Family Temporary Disability Leave Account, the Director of the Division of Taxation or the Office of Management and Budget shall seek to set-off that taxpayer's, partner's or shareholder's share of the payment of that indebtedness. The amount set-off shall not allow for the deduction of any expenses or other deductions which might be attributable to the taxpayer, partner or shareholder subject to set-off.

The Division of Taxation may initiate procedures to set-off the tax debt of a specific vendor upon the expiration of ninety (90) days after either the issuance by the Division of a final determination on any protest filed by the taxpayer against an assessment or final audit determination. A set-off reduces the contract payment due to a vendor by the amount of that vendor's State tax indebtedness of any member-partner or shareholder of the partnership or S Corporation respective N.J.A.C. 18:2-8.3.

The Director of the Division of Taxation shall give notice of the set-off to the taxpayer, partner or shareholder and shall provide an opportunity for a hearing within thirty (30) days of such notice under the procedures for protests established by N.J.S.A. 54:49-18. No requests for conference, protect or subsequent appeal to the Tax Court from any protest permitted under N.J.S.A. 54:49-19 shall stay the collection of the indebtedness. Interest that may be payable by the State to the taxpayer, pursuant to P.L. 1987, c. 184 (N.J.S.A. 52:32-35) shall be stayed.

#### EXECUTIVE ORDER 271 – COVID-19 VACCINE POLICY.

In accordance with Executive Order No. 271 Contractor must maintain a policy that requires all covered workers to either provide proof to Contractor that they have been fully vaccinated or submit to COVID-19 testing at minimum one to two times weekly, as further set forth in Exhibit A attached hereto. Contractor shall certify, at the time of submission of any invoice, that they have complied with this requirement and EO 271 during the period of time covered by the invoice.

IN WITNESS WHEREOF, the Owner and the Contractor have caused this contract to be executed by their duly authorized representatives on the date first written above.

# STOCKTON UNIVERSITY

By: Lennifer Potter

Title: Vice President for Administration & Finance and Chief Financial Officer

Date: 1/25/2022

SURETY MECHANICAL SERVICES OF NJ, LLC

By: Francis Saffioti

Title: Pressurer Secretary/Treasurer

Date: 01/25/2022

Maria 2

#### **EXHIBIT A**

# TERMS AND CONDITIONS RELATED TO COVID-19 VACCINATION AND TESTING AS REQUIRED BY NEW JERSEY EXECUTIVE ORDER 271

In accordance with Executive Order No. 271 ("EO 271"), all contractors and subcontractors (collectively "Contractors") must maintain a policy that requires all covered workers to either provide proof to the Contractor that they have been fully vaccinated or submit to COVID-19 testing at minimum one to two times weekly. Any covered worker that has not provided proof that the worker is fully vaccinated must submit to a minimum of weekly or twice weekly testing on an ongoing basis until fully vaccinated. This requirement applies to all contracts for services or construction that exceed \$35,500. It does not apply to contracts for the provision of goods.

Covered workers must demonstrate proof of full vaccination status by presenting the following documents to the Contractor:

- a. The CDC COVID-19 Vaccination Card issued to the vaccine recipient by the vaccination site, or an electronic or physical copy of the same;
- b. Official record from the New Jersey Immunization Information System or other State immunization registry;
- c. A record from the health care provider's portal/medical record system on official letterhead signed by a licensed physician, nurse practitioner, physician's assistant, registered nurse or pharmacist;
- d. A military immunization or health record from the United Sate Armed Forces; or
- e. Docket mobile phone application record or any state specific application that produces a digital health record.

To satisfy the testing requirement, a covered worker must undergo screening testing at minimum one or two times weekly. Where a Contractor requires an unvaccinated covered worker to submit proof of a COVID-19 test, the worker may choose either antigen or molecular tests that have Emergency Use Authorization by the U.S. Food and Drug Administration ("FDA") or are operating per the Laboratory Developed Test requirements by the U.S. Centers for Medicare and Medicaid Services. When a Contractor provides unvaccinated covered workers with on-site access to COVID-19 tests, the Contractor may elect to administer or provide access to either an antigen or molecular test. If a covered worker is not working on-site during a week where testing would otherwise be required, the Contractor's policy need not require the covered worker to submit to testing for that week.

The Contractor also must have a policy for tracking test results from testing required by these terms and must report results to the local public health departments.

"Covered worker" means any full-time or part-time worker of a Contractor working on or in connection with a contract with the University that requires such worker to enter, work at, or provide services in any place, site, installation, building, room, or facility in which the University

conducts official business or is within the University's custody or control. This requirement does not apply to workers who perform work outside the State of New Jersey.

In accordance with EO 271, a covered worker shall be considered "fully vaccinated" for COVID-19 two weeks or more after they have received the second dose in a two-dose scries or two weeks or more after they have received a single-dose vaccine. A covered worker will only be considered fully vaccinated when they have received a COVID-19 vaccine that is currently authorized for emergency use by the FDA or the World Health Organization, or that are approved for use by the same. Covered workers who are not fully vaccinated, or for whom vaccination status is unknown or who have not provided sufficient proof of documentation, shall be considered unvaccinated for purposes of this requirement.

Surety Mechanical Services invoice, that they have complied with	of NJ, LLC shall certify, at the time of submission of any the this requirement and EO 271 during the period of time
covered by the invoice.	Authorized Representative
	Francis Saffioti Name
	Secretary/Treasurer
	Title
	Surety Mechanical Services of NJ, LLC

Company Name



#### **PROPOSAL PAGE**

(Part 1 of 2)

Having examined the bid documents and the site of the work and being familiar with all of the conditions surrounding the construction of the project, including the availability of materials and labor, the Contractor hereby submits to furnish all labor, materials, supplies, and to construct the project as specified, within the time set forth herein, and at the price stated. This price is to cover all expenses incurred in performing the work required of which this submission is a part.

#### Lump Sum Base Bid

All-inclusive lump-sum amount to provide all services and materials meeting the requirements of this IFB and corresponding project documents.

Includes Allowance of \$50,000.00 for unforeseen circumstances

\$ 833,500

Firm Name:	Surety Mechanical Services of NJ, LLC
Bidder's Signature:	- trancis Saffesti.
Date:	12/21/2021

(Proposal Page continued on next page)



#### **PROPOSAL PAGE**

(Part 2 of 2)

#### **Proposing Firm Information**

Vendor Name (Please Print Clearly)	Surety Mechanical Services of NJ, LLC
Bidder's Signature	
Print Name & Title	Francis Saffioti, Secretary/Treasurer
Address	300 Thomas Ave, Suite 201
	Williamstown, NJ 08094
Phone	856-875-1160
Email	frank@suretymechanical.com
Federal Employer ID#	

Note: Bidder must initial and date any and all changes made on any of the' Proposal Pages'. No corrections will be accepted without Bidder's initials and date next to any and all corrections.

#### **Primary Contact for Project**

Name	Sean Solomon
Phone	856-875-1160
Email	sean@suretymechanical.com

The execution of and Bidder's signature on this Proposal Page attests that:

Vendor hereby warrants that it has received and read the IFB and all addenda thereto. Vendor warrants that it understands the requirements of the work required by the University. Vendor warrants that the information contained in its submission is truthful, accurate and that it is capable and willing to accept a contract arising from this IFB. Vendor warrants that it has the capabilities and credentials required by the IFB. Vendor warrants that it will faithfully perform the work required by this IFB and will abide by the terms, conditions and other requirements of this IFB.

The Bidder has read, understands, and agrees to all terms, conditions, and specifications set forth in the IFB, including all addenda. Furthermore, signature by the vendor signifies that addenda issued, the invitation for bid, the University's terms and conditions and the responsive submission constitute a contract immediately upon notice of acceptance by the University for any or all the items and/or services submitted. Failure to hold prices or to meet any other terms and conditions as defined in either addenda, the invitation to bid or any other project document during the term of the contract shall constitute a breach and may result in contract termination. A defaulting bidder may also be liable, at the option of the University, for the difference between the contract price and the price proposed by an alternate contractor for the goods and/or services in addition to other remedies available.

The bidder acknowledges and affirms that it has personal knowledge of or has obtained and reviewed a copy of the valid prevailing wage rates for all trades involved in the project for the geographical location of the project as issued by the Commissioner if the Department of Labor and Workforce Development, Trenton, New Jersey 08625.

Stockton University Federal ID#:
NJ Tax Exempt per N.J.S.A. 54:32B - Exempt Organization



856-663-6000 • P.O. Box 5300, Cherry Hill, N.J. 08034

#### Classified Ad Receipt (For Info Only - NOT A BILL)

0005009200

Invoice

\$35.52

Ad No.: Pymt Method

Net Amt:

Customer: STOCKTON UNIVERSITY

Address: 101 VERA KING FARRIS DR

GALLOWAY NJ 08205

USA

Run Times: 1 No. of Affidavits:

Run Dates: 11/22/21

Text of Ad:

#### **Stockton University: Invitation for Bid Advertisement**

Notice is hereby given that sealed submissions for *IFB 22-20 HVAC Renovations: Building 70* will be received by Stockton University, Purchasing Office (Upper N-Wing), 101 Vera King Farris Drive, Galloway, NJ 08205 until 3:00 p.m. Eastern Time on December 21, 2021 at which time submissions will be publicly opened and read aloud. There will also be a site Visit on November 30, 2021 at 10:30 a.m. Eastern Time. For details, please view the project documents located on the Office of Procurement & Contracting website.

Documents, specifications, addenda and questions and answers are available once you login into the University's website at <a href="https://stockton.edu/procurement-contracting/index.html">https://stockton.edu/procurement-contracting/index.html</a> on the current 'Request for Proposals' page. Submissions shall be made on the forms provided, in the manner prescribed therein and submitted in sealed envelopes clearly displaying the name and address of the Vendor along with the project number and title.

Please note that Vendors are required to follow public health guidelines regarding physical distancing and face coverings at the project opening. The successful vendor is required to be registered with the New Jersey Division of Revenue in accordance with New Jersey statute N.J.S.A. 52:32-44. Vendors must comply with the requirements of the New Jersey Law Against Discrimination N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq. Stockton University encourages the participation of Small/Women, Minority, and Veteran owned businesses. (\$35.52)

-0005009200-01



#### **Order Confirmation**

#### Order# 0000177181

Client: STOCKTON UNIVERSITY Payor Customer: STOCKTON UNIVERSITY

**Client Phone:** 6096524528 **Payor Phone** 6096524528

Account #: 8002919 Payor Account:

Address: Payor Address:

ACCOUNTS PAYABLE ACCOUNTS PAYABLE
GALLOWAY NJ 08205 GALLOWAY NJ 08205

Fax: Sales Rep Ordered By

EMail AccountsPayable@stockton.edu ematos ematos

Total Amount \$24.00 Status: Materials:

Payment Amount \$0.00

Amount Due \$24.00 <u>Tear Sheets</u> <u>Proofs</u> <u>Affidavits</u> <u>Blind Box</u>

**Tax Amount:** 0.00 0 0

Payment Method: Invoice - Statement PO Number: IFB 22-20 HVAC Renovations: Building 70.

Order Notes: Invoice Text:

 Ad Number
 Ad Type
 Color

 0000177181-01
 SJP CLS Legal Liner
 \$0.00

Pick Up Number Ad Size Production Method

2 X 30 li AdBooker (liner)

<u>Production Color</u> <u>Production Notes</u>

Product and ZonePlacementPosition# InsertsACP Press of Atlantic CityC-Legal AdsLegal Display Ads1

Run Schedule Invoice Text: Stockton University: Invitation for Bid Advertisement Notice is hereby given that sealed

**Run Dates** 11/22/2021

Product and Zone Placement Position # Inserts

ACP pressofatlanticcity.com C-Legal Ads Legal Display Ads 1

Run Schedule Invoice Text: Stockton University: Invitation for Bid Advertisement Notice is hereby given that sealed

Run Dates 11/22/2021

TagLine: STOCKTONUNIVERSITYINVITATIONFORBIDADVERTISEMENTNOTICEISHEREBYGIVENTHATSEALEDSUBM

ISSIONSFORIFB2220HVACRENOVATIONSBUILDING70WILLBERECEIV

**Ad Content Proof** 

Note: Ad size does not reflect actual ad size

#### STOCKTON UNIVERSITY: INVITATION FOR BID ADVERTISEMENT

Notice is hereby given that sealed submissions for IFB 22-20 HVAC Renovations: Building 70 will be received by Stockton University, Purchasing Office (Upper N-Wing), 101 Vera King Farris Drive, Galloway, NJ 08205 until 3:00 p.m. Eastern Time on December 21, 2021 at which time submissions will be publicly opened and read aloud. There will also be a site Visit on November 30, 2021 at 10:30 a.m. Eastern Time. For details, please view the project documents located on the Office of Procurement & Contracting website.

Documents, specifications, addenda and questions and answers are available once you login into the University's website at https://stockton.edu/procument-contracting/index.html on the current 'Request for Proposals' page, Submissions shall be made on the forms provided, in the manner prescribed therein and submitted in sealed envelopes clearly displaying the name and address of the Vendor along with the project number and title.

Please note that Vendors are required to follow public health guidelines regarding physical distancing and face coverings at the project opening. The successful vendor is required to be registered with the New Jersey Division of Revenue in accordance with New Jersey statute N.J.S.A. 52:32-44. Vendors must comply with the requirements of the New Jersey Law Against Discrimination N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq. Stockton University encourages the participation of Small/Women, Minority, and Veteran owned businesses.

Printer Fee: \$24.00 Pub Date: November 22, 2021

Order #: 0000177181



# **Invitation for Bid**

IFB 22-20
HVAC Renovations: Building 70

Stockton University
Office of Procurement & Contracting
Division of Administration and Finance
101 Vera King Farris Drive: Upper N-Wing
Galloway NJ 08205
609.652.4325



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#### **Schedule of Events Timetable**

Release Date	<b>→</b>	November 22, 2021
Site Visit (see table below for details)	<b>+</b>	November 30, 2021 at 10:30 a.m. Eastern Time
Questions Due	<b>→</b>	December 3, 2021
Answers Posted to Website	<b>→</b>	December 9, 2021
Submissions Due (see table below for details)	<b>→</b>	December 21, 2021 at 3:00 p.m. Eastern Time

Site Visit Information	Bid Opening Information
<ul> <li>Interested parties may meet at the Lobby in Building 70 (Facilities &amp; Plant Operations) located on the Galloway, NJ Campus. If using the University entrance off Pomona Road, the building will be your first left.</li> </ul>	<ul> <li>Interested parties may meet in the Upper N-Wing Conference room, located on the Galloway, NJ campus. If using the elevator, please use floor button #1.</li> </ul>
<ul> <li>Attending the Site Visit is not mandatory.</li> </ul>	<ul> <li>Attending the Bid Opening is not mandatory.</li> </ul>

- Galloway Campus Map
- Atlantic City Campus Map

In order to be considered for the award, all information must be received by the required date and time. Any submission not received on time will be rejected.

#### **Question & Answer Period**

All questions should be submitted via email, with the subject heading:

- IFB 22-20 HVAC Renovations: Building 70 -

- ✓ Questions regarding IFB information shall be sent to: <a href="mailto:RFP-Purchasing@stockton.edu">RFP-Purchasing@stockton.edu</a>
  - Note: If contact by email is not possible, please call Robert Yufer, Procurement Manager, at 609.652.4698 for an alternate solution.
  - All questions submitted will be answered (as an Addendum) and posted on the <u>Procurement & Contracting website</u> on the date indicated above in the 'Schedule of Events Timetable'.
  - Vendors are not to contact any University department directly, in person, by telephone, email, or fax concerning this IFB.
- ✓ Questions regarding opening documents or accessing items on the website should be sent to:

Robert Yufer

**Procurement & Contracting** 

E-mail: Robert.Yufer@stockton.edu



# **Required Procurement Documents**

The Procurement documents listed below are mandated by State regulation and University policy. All documents listed must be received in order for the University to issue a contract for this project.

#### Required Procurement Documentation & Vendor's Checklist

T	HE FOLLOWING DOCUMENTATION MUST BE INCLUDED WITH SUBMISSION OR BID WILL BE REJECTED (# 1	<b>– 9)</b>
1	<u>Proposal Page(s)</u> (Do Not Modify This Form)  ➤ Note: Please make every effort to include the Proposal Page(s) at the beginning of submission	
2	Acknowledgement of Addenda (If any issued, will be posted on the Office of Procurement & Contracting website along with all other project documents)	
3	Consent of Surety (100%) (form serves as an example)	
4	Bid Bond (10% of Base Bid + Add Alternates) (form serves as an example)	
5	Subcontractor Disclosure Form	
6	Aggregate Rating and Uncompleted Work Certification  ➤ Required for General Contractor and all prime trade subcontractors	
7	Ownership Disclosure	
8	Disclosure of Investment Activities in Iran	
9	Non-Collusion Affidavit	
THE	FOLLOWING FORMS SHOULD BE INCLUDED WITH SUBMISSION & MUST BE RECEIVED BEFORE CONTRACT A	WARD
10	Surety Disclosure Statement & Certification	
11	Exhibit 'B' Equal Employment Opportunity + Additional Mandatory Language for Construction Contracts  The following form is required as evidence of Exhibit 'B' EEO Language  Initial Project Workforce Report (AA-201)	
12	<ul> <li>Chapter 51 / Executive Order 117 Vendor Certifications and Disclosure of Political Contributions</li> <li>Note: If form does not open or displays an Adobe error message, please try to open with Internet Explorer. If that does not work, please an email <a href="mailto:Robert.Yufer@stockton.edu">Robert.Yufer@stockton.edu</a> for a PDF version.</li> </ul>	
13	Chapter 271 Vendor Certification & Political Contribution Disclosure Form  NOTE: It is the responsibility of the vendor to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC), pursuant to N.J.S.A. 19:44A-20.13 (P.L. 2005, c. 271, section 3) if vendor receives in excess of \$50,000 from contracts from one or more public entities during a calendar year	
14	Subcontractor Utilization Form (required even if no subcontractors are being utilized)	
15	Source Disclosure Form	
16	Proof of Ability to Obtain Required Insurance (See Insurance section of this IFB for specifications; provided by bidder)  Certificate of Insurance must name Stockton University and the State of NJ as additional insureds.	
17	<u>Public Works Certificate(</u> s) (Required by General Contractor + All Subcontractors; provided by bidder. Must be valid at time of submission)	
18	NJ Business Registration Certificate(s) (General Contractor + All Prime Subcontractors; provided by bidder)  Vendors should verify NJ BRCs here: Online Business Registration Certificate Service  NJ Business Registrations must be valid at the time of award	
19	Taxpayer Identification Request (W-9)	
20	COVID-19 Testing & Vaccination Requirements	
	Additional Forms & Information	
21	Small Business Set Aside Program Small Business Set Aside Status: Not Mandated for this Project	
22	Electronic Submission (exact copy of your submission on a USB flash drive)	



#### **PURPOSE & INTENT**

- The intent of this IFB is to award a contract(s) to the responsible and apparent lowest cost vendor.
- Stockton University Terms and Conditions will apply to all contracts or purchase agreements made
  with the University. These terms are in addition to the terms and conditions set forth in this IFB and
  should be read in conjunction with them unless specifically indicated otherwise.

#### **SUBMISSION INFORMATION**

- Vendors shall follow the instructions contained in this IFB in preparing and submitting a response.
   Failure to abide by the instructions may cause the submission to be deemed non-responsive and may be cause for rejection.
- The Required Forms, Addenda, Questions and Answers can all be accessed once you login into the
  Purchasing website at <a href="www.stockton.edu/purchasing">www.stockton.edu/purchasing</a>. It is the responsibility of the vendor to monitor
  the website for any changes, addenda, additions, clarifications, cancellations etc., as related to this
  IFB. The University will not be responsible for a vendor's failure to retrieve, review and/or
  acknowledge any information uploaded or modified on the website.

#### **UNIVERSITY BACKGROUND**

• The University is a public institution of higher education organized under the laws of the State of New Jersey with a current enrollment of approximately 9,900 students. The University is a distinguished University of arts, sciences and professional studies and is known for exceptional program offerings and an interdisciplinary approach to learning, providing students with a diverse, high-quality education. The University's main facilities are located on a 1,600-acre campus in Galloway, New Jersey. The University also has instructional sites in Ocean, Atlantic, and Cape May counties which provide a range of academic offerings, from continuing education to undergraduate and graduate-level coursework.



#### **GENERAL DEFINITIONS**

- A. Addendum: Written revision to this IFB issued by the Office of Procurement & Contracting.
- **B.** *All-Inclusive Price*: A price that is all-inclusive of all direct and indirect costs, including, but not limited to, delivery, direct labor costs, overhead, fee or profit, equipment, materials, supplies, managerial support, documents, forms, reproductions thereof and any other costs. No additional fees or costs shall be paid by the University unless there is a change in the scope of work.
- **C.** *Amendment*: A change in the scope of work to be performed by the Vendor after Contract award. An amendment is not effective until signed by the University's Vice President for Administration and Finance and Chief Financial Officer or designee.
- **D.** Awarded Vendor: The firm awarded a Contract resulting from this IFB.
- **E.** *Bidder*: The entity providing a submission in response to this offering.
- **F.** *Contract*: The Contract awarded as a result of this IFB and shall consist of any addenda to this IFB, this IFB (including the University's Standard Contract Terms and Conditions), the firm's submission and the contract incorporating these documents and signed by the Vendor and the University's Vice President for Administration and Finance and Chief Financial Officer or designee.
- **G.** *Contractor*: The entity providing a submission in response to this bid.
- **H.** Firm: The entity providing a submission in response to this bid.
- I. General Contractor (GC): Main contractor or prime contractor is responsible for the day-to-day oversight of a construction site, management of vendors and trades, and the communication of information to all involved parties throughout the course of a building project.
- **J.** *Invitation for Bid (IFB)*: This document, which establishes the project and contract requirements and solicits submissions to meet the needs of the University.
- **K.** *Joint Venture*: A business undertaking by two or more entities to share risk and responsibility for a specific project.
- **L.** *May*: Denotes that which is permissible, but not mandatory.
- M. Must: Denotes that which is a mandatory requirement.
- **N.** *Project*: The undertakings or services that are subject to this bid.
- **O.** *Shall:* Denotes that which is a mandatory requirement.
- **P.** *Should*: Denotes that which is recommended, but not mandatory.
- Q. State: State of New Jersey
- **R. Subcontractor**: An entity having an arrangement with the contracted vendor, whereby the contracted vendor uses the products and/or services of that entity to fulfill some of its obligations under its Contract, while retaining full responsibility for the performance of all of its obligations under the Contract, including payment to the Subcontractor. The Subcontractor has no legal relationship with the University, only with the awarded vendor.
- **S.** University or The University: Refers to Stockton University.
- **T. Vendor**: The entity providing a submission in response to this bid.



#### II. PROJECT INTRODUCTION

**A.** The University is seeking to contract with a qualified vendor to provide heating, ventilation and air conditioning (HVAC) renovations in Building 70, located on the Galloway, NJ campus.

## **III. SCOPE OF SERVICES**

- A. Work to be performed under this project includes, but is not necessarily limited to the following. For additional information, please view the associated project documents.
  - Demolition of the existing open loop geothermal system and the existing ventilation outside air system and replace the system with a conventional Direct Expansion (DX) Variable Air Volume (VAV) heating and cooling system.
  - **2.** Demolition of the existing hydronic space heating plant and replace with a new hydronic space heating plant.
  - **3.** Implement new HVAC controls to allow heating and cooling of the building with the existing baseboard heating system to remain as the first stage of heating.

#### B. Work to be Performed by Stockton University

**1.** See construction drawings for a list of work by the University located on the Office of Procurement & Contracting website within the project table for this IFB.

#### C. Vendor Requirements

- Contractor must bid the project to meet the schedule outlined in the bidding documents. This
  may include weekend and/or shift work, and contractor must staff the project accordingly to
  meet the schedule. Stockton will not entertain change orders for contractor's inability to meet
  the schedule.
- 2. Contractor must outline in submission any long lead times for items that may impact the ability to meet the deadlines of the schedule.
- **3.** Contractor is responsible to submit all permits.
- **4.** Contractor is responsible to schedule and manage all required inspections, including but not limited to, the Final Certificate of Occupancy inspection.
- 5. Contractor must follow all OSHA and Stockton safety guidelines and procedures.

#### D. Summary of Project Milestones

- 1. Substantial Completion Date: 190 calendar days (from notice to proceed date)
- 2. Final Completion Date: 20 calendar days (from substantial completion date)
- 3. Total Project Duration: 210 calendar days
- **4.** Unfavorable weather conditions shall not be justification for delays in completion or final completion dates as specified. No change orders will be issued or approved for extensions of time due to weather conditions.

## E. Schedule of Project Allowance

- 1. The following allowance shall be included for this project within the Base Bid. The allowance is to be expended at the discretion of the University. No work shall be billed against the allowance without prior written approval by the University and the Contractor is required to substantiate, in detail, costs incurred for allowance work. Any unused portion of this allowance shall be credited back to the University against the Lump Sum Bid amount at the completion of the project.
  - **a.** Allowance: \$50,000.00 for unforeseen circumstances.



F. Project will be constructed under a single prime general construction contract (all trades combined).

#### **G.** Liquidated Damages

- 1. First thirty (30) Days: \$1,000 per calendar day
- 2. After thirty (30) Days: \$2,500 per calendar day
- 3. Liquidated Damages will be applied starting the day after the contractually agreed upon final completion date until the day of the actual final completion is reached and the final Certificate of Acceptance (CA) is issued by DCA.
- **4.** The vendor shall not be charged with liquidated damages or any excess cost when the University determines that the vendor is without fault and the vendor's reasons for the time extension are reasonable and acceptable to the University.

#### H. Use of Premises

- 1. Contractor shall restrict work, staff and debris to the contract premises and as authorized by the University. Contractor is responsible for coordination of trades to ensure timely completion of work and to minimize disruption of the activities of the University.
- 2. Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond the site perimeter unless prior approval of the University is received prior to conduction of such work or operations. Contractor parking defined in Division 1 section
- **3.** Driveways & Entrances: Keep driveways and entrances serving premises clear and available to Stockton University, Stockton employees, and emergency vehicles at all times.
- **4.** Do not use areas outside the limit of construction site for parking or storage of materials.
- **5.** Upon completion of work, the awarded vendor is responsible for leaving any construction areas in clean condition.

#### I. Intent of Contract

- 1. Project documents provided for this contract are intended to require the contractor to provide for everything reasonably necessary to accomplish the proper and complete finishing of work.
- 2. All work and materials included in the specifications and not shown on the drawings, or shown on the drawings but not in the specifications, shall be performed and/or furnished by the contractor as if described in both.
- **3.** Any incidental materials and/or work not specified in the drawings or specifications which are, nevertheless, necessary for the true development thereof and reasonably inferable therefrom, the contractor shall understand the same to be implied and required, and shall perform all such work and furnish all materials as if particularly delineated or described therein.
- **4.** Should there be an obvious error between the drawings, specifications, etc., the most stringent constraints of the conflicting information shall be assumed by the contractor, unless otherwise stated in writing by the University Project Manager or designee, and the contractor shall complete the work as reasonably required, consistent with the intent of such drawings and specifications as interpreted by the University.
- **5.** When a conflict exists between scope specific information in this IFB and the Project Specifications, and/or accompanying documents, the Project Manual and accompanying documents take precedence.



#### J. General Bidding Requirements

- 1. The bidder is required to submit a Bid Bond in the sum of ten percent (10%) of the base bid price plus the prices for all Add Alternates, shall become the property of Stockton University in the event the contract and bond are not executed within the time set forth, as liquidated damages for the delay and additional expense incurred by the OWNER.
- 2. Bidder is required to submit a Consent of Surety to execute the final bond as required by the specifications and to become surety in the full amount of the contract price (100%) for the faithful performance of the contract.
- **3.** The Contractor is required to comply with and be able to meet the requirements of Article 13.3.1 Performance and Payment Bond of the General Conditions for the Lump Sum Bid Total.
- 4. The work performed under this IFB is subject to the New Jersey Prevailing Wage Act (N.J.S.A. 34:11-56.25 et seq). The Act requires the payment of minimum rates of pay to laborers, craftsmen, and apprentices employed on public works projects. Covered workers must receive the appropriate craft prevailing wage rate as determined by the Commissioner of Labor and Workforce Development.
  - a. Anyone interested in bidding on or engaging in any contract (or part thereof) for public work which is subject to the provisions of the Prevailing Wage Act must register with the Division of Wage and Hour Compliance as required by the Public Works Contractor Registration Act (PWCRA) N.J.S.A. 34:11-56.48 et seq., which establishes a unified procedure for the registration of contractors and subcontractors engaged in public works building projects. Upon registration, the contractor and/or subcontractor will be issued a certificate indicating compliance with the requirements of the Act.
  - **b.** A Contractor's Public Works Certificate must be valid at the time a bid submission is due. No vendor or subcontractor, including a subcontractor not listed in the bid proposal, shall engage in the performance of any public work subject to the contract, unless the vendor or subcontractor is registered pursuant to that act.
  - c. For information on Public Works Projects and Wage Rate Determinations, please visit the website for New Jersey Department of Labor and Workforce Development.
- 5. The work performed under this contract is subject to N.J.A.C 17:19-2.1. Only those firms holding a valid classification issued by the Division of Property Management and Construction (DPMC) shall be eligible to bid for work on a public work project, unless otherwise permitted by law. In addition, no bid proposal for a public work project shall be accepted unless every subcontractor that is required by law, the bid advertisement, or the bid documents, to be named in the bid proposal holds a valid classification issued by the DPMC. Said classification and rating must be valid on the bid due date for the project.
  - **a.** Firm shall furnish a current copy of all applicable licenses and permits as required in the DPMC-27 (form submitted by a firm seeking classification).



#### IV. PRICING

- **A.** Pricing for this project shall be detailed on the '*Proposal Page*' of this IFB.
- **B.** Base Bid costs are all-inclusive and must include, but are not necessarily limited to, all labor, materials, equipment, supervision, coordination efforts, services, filing fees, security, insurance, deliveries, allowance (if applicable), profit, and all other associated or related work and items that are necessary for the completion of the full scope of work.
- **C. Unit Prices** (*if applicable to project*)
  - 1. Unit prices govern addition to or deduction from quantity included in the bid proposal and amounts actually installed on job.
  - 2. Unit Prices shall have the same value for both add and deduct.
  - **3.** Unit prices must include, but are not necessarily limited to, all labor, materials, equipment, supervision, coordination efforts, services, filing fees, security, insurance, deliveries and all other associated or related items specified herein that are necessary for the completion of the full scope of work.
- **D.** Add and Deduct Alternates (if applicable) are not listed on the '*Proposal Page*' form in any particular sequence. The University shall have complete discretion as to which Alternates and/or Deducts it will actually select for incorporation into the contract. The contract will be awarded by the University to the responsive and responsible bidder that submits the lowest price for the base bid plus all of the Add/Deduct Alternates, if any, actually selected by the University.
- **E.** Submission pricing must remain valid for no less than sixty (60) days from the submission due date. If awarded, Vendor agrees not to raise any price(s) for the duration of the contract, except as allowed by the contract.
- **F.** All pricing must be typed or written in ink. Any price change (including "white-outs") must be initialed. Failure to initial price changes shall preclude vendor from contract award.
- **G.** If the Firm puts a zero (0) on an item in the price schedule, the University conclusively deems that price to be zero and that the Firm is offering the item to the University at no cost. Any other notations, such as "N/A" or a blank unit price will be interpreted as an item which the firm cannot supply or deliver and therefore, may result in the submission being deemed non-responsive.
- **H.** All costs must be detailed on the Proposal Page of this IFB in the format provided. Any edited or dissimilar formats may be rejected.
- I. All pricing must be typed or written in ink. Any price change (including "white-outs") must be initialed. Failure to initial price changes shall preclude vendor from contract award.
- **J.** Refer to the *Proposal Page(s)* within this IFB for additional information. *Please do not modify the Proposal Page(s)*. The data should be entered as requested and any changes may result in rejection of submission.

# V. TERM OF CONTRACT & TERMINATION LANGUAGE

**A.** Contract period will be for the amount of time necessary to complete all the requirements of this IFB as determined by the documents and contract provided by the Stockton University Facilities Planning & Construction Department.



#### **B.** Termination of Contract for Convenience

1. Notwithstanding any provision or language in a contract resulting from this offering, the University may terminate this contract at any time, in whole or part, for convenience upon no less than thirty (30) days written notice to the awarded vendor.

#### C. Termination of Contract for Cause

- 1. Where an awarded vendor fails to perform or comply with a contract or a portion thereof, the University may terminate the contract, in whole or part, upon thirty (30) days' written notice to the awarded vendor with an opportunity to respond; and
- 2. Where in the reasonable opinion of the University, an awarded vendor continues to perform a contract poorly as demonstrated by e.g., formal complaints, late delivery, poor performance of service, short-shipping and there has been a failure on the part of the vendor to make progress towards ameliorating the issue(s) or problem(s) set forth in the complaint, the University may terminate the contract, in whole or in part, upon thirty (30) days' notice to the vendor with an opportunity to respond.
- **D.** In cases of emergency the University may shorten the time periods of notification and may dispense with an opportunity to respond.
- **E.** In the event of termination under this section, the vendor shall be compensated for work performed in accordance with the contract, up to the date of termination. Such compensation may be subject to adjustments.

#### **VI. POST AWARD**

**A.** Following the "Notice of Intent to Award," the awarded vendor(s) shall receive a contract with a request to review terms, deliverables, costs and the University's expectations in general. The awarded vendor will be able to address any contract questions or concerns at this time. If the awarded vendor does not receive a contract within seven business days of award, please email Robert.Yufer@stockton.edu for an update.

#### VII. SUBMISSION REQUIREMENTS

- **A.** In order to be considered, vendors must submit a complete response to this IFB.
- **B.** Submissions should be presented in a straightforward, concise and clear manner (HIGHLY preferred in PDF format and as a single file), so that it can be easily comprehended and understood. Every effort should be made to avoid duplicating the information presented in the submission.
- **C.** Submissions should not contain Uniform Resource Locators (URL) or web addresses. The internet contains dynamically changing content, and any inclusion of a URL or web address is indicative of potentially changing information. Inclusion of a URL or web address implies that the IFB's content changes as the referenced web page changes.
- **D.** Submissions should be organized by distinct sections corresponding with the following:
  - **1.** Fully executed 'Proposal Page(s)'
  - 2. All information requested on the 'Required Procurement Documents' page of this IFB.
  - 3. Any and all information requests designated within the accompanying project documents.



#### **Submission Instructions**

In order to be considered, submissions must arrive at the Purchasing Office of the University before the date and time specified in this IFB under the Schedule of Events Timetable (subject to modification through Addenda). Vendor must allow sufficient time for parking and delivery of submission. The time for receipt is firm. Submissions may be submitted by mail or in person. Vendors mailing submissions should allow for normal mail delivery time and internal circulation within the University to ensure the timely receipt of submissions by the University. Stockton University assumes no responsibility for unmarked Fed Ex, UPS or any other carrier/mail services.

Submissions shall be sealed and indicate the *IFB Number* + *Project Title* on the package, as well as the Vendor's name and address.

Sealed submissions are to be sent to:

Stockton University
Office of Purchasing: Upper N-Wing
101 Vera King Farris Drive
Galloway, NJ 08205

ANY SUBMISSION NOT RECEIVED ON TIME AT THE LOCATION NOTED ABOVE WILL BE EXCLUDED FROM CONSIDERATION. LATE SUBMISSIONS ARE INELIGIBLE FOR CONTRACT AWARD.

The Vendor must provide one (1) complete ORIGINAL physical submission, and it should be clearly marked as the "Original." The firm should also submit one (1) exact copy on a USB flash drive preferably as a single PDF.

- An initial screening of all submissions will be conducted to determine overall responsiveness. Submissions determined to be incomplete, non-responsive or conditional may be disqualified.
- The University recommends that each Vendor retain a copy of its submissions for internal record keeping purposes.
- Submission shall contain all documents as detailed on the 'Required Procurement Documents' page of this project.

IFB 22-20

**Bidder's Signature:** 

Date:

HVAC Renovations: Building 70



#### **PROPOSAL PAGE**

(Part 1 of 2)

Having examined the bid documents and the site of the work and being familiar with all of the conditions surrounding the construction of the project, including the availability of materials and labor, the Contractor hereby submits to furnish all labor, materials, supplies, and to construct the project as specified, within the time set forth herein, and at the price stated. This price is to cover all expenses incurred in performing the work required of which this submission is a part.

<u>Lump Sum Base Bid</u>	
All-inclusive lump-sum amount to provide all services and	
materials meeting the requirements of this IFB and	\$
corresponding project documents.	
• Includes Allowance of \$50,000.00 for unforeseen circumstances	
Firm Name:	

(Proposal Page continued on next page)

IFB 22-20

**HVAC Renovations: Building 70** 



#### **PROPOSAL PAGE**

(Part 2 of 2)

#### **Proposing Firm Information**

Vendor Name	
(Please Print Clearly)	
(Fieuse Finit Clearly)	
Bidder's Signature	
Print Name & Title	
Address	
Dhana	
Phone	
e 11	
Email	
F. J   F     D. !!	
Federal Employer ID#	
Note: Bidder must initial and date	any and all changes made on any of the' Proposal Pages'. No corrections will be accepted
without Bidder's initials and date	
without bidder's initials and date	HEXT TO ATTA ATT ATT ATT ATT ATT ATT ATT AT

#### **Primary Contact for Project**

Name	
Phone	
Email	
Note: The emo	ul address provided above shall be deemed as an appropriate means of communication for this project.

The execution of and Bidder's signature on this Proposal Page attests that:

Vendor hereby warrants that it has received and read the IFB and all addenda thereto. Vendor warrants that it understands the requirements of the work required by the University. Vendor warrants that the information contained in its submission is truthful, accurate and that it is capable and willing to accept a contract arising from this IFB. Vendor warrants that it has the capabilities and credentials required by the IFB. Vendor warrants that it will faithfully perform the work required by this IFB and will abide by the terms, conditions and other requirements of this IFB.

The Bidder has read, understands, and agrees to all terms, conditions, and specifications set forth in the IFB, including all addenda. Furthermore, signature by the vendor signifies that addenda issued, the invitation for bid, the University's terms and conditions and the responsive submission constitute a contract immediately upon notice of acceptance by the University for any or all the items and/or services submitted. Failure to hold prices or to meet any other terms and conditions as defined in either addenda, the invitation to bid or any other project document during the term of the contract shall constitute a breach and may result in contract termination. A defaulting bidder may also be liable, at the option of the University, for the difference between the contract price and the price proposed by an alternate contractor for the goods and/or services in addition to other remedies available.

The bidder acknowledges and affirms that it has personal knowledge of or has obtained and reviewed a copy of the valid prevailing wage rates for all trades involved in the project for the geographical location of the project as issued by the Commissioner if the Department of Labor and Workforce Development, Trenton, New Jersey 08625.

Stockton University Federal ID#: 22-2832788

NJ Tax Exempt per N.J.S.A. 54:32B - Exempt Organization



#### PROJECT LANGUAGE SPECIFIC TO STOCKTON UNIVERSITY

#### I. PROCEDURAL REQUIREMENTS & AMENDMENTS

- **A.** The awarded vendor will comply with all procedural instructions that may be issued from time to time by the Director of Procurement & Contracting of the University or his designee.
- **B.** During the contract period, no change is permitted in any of its conditions and specifications unless the awarded vendor receives written approval from the Director of Procurement & Contracting or his designee.
- **C.** Vendors must supply Stockton University with all applicable warranty information, whether expressed or implied.
- **D.** Should the awarded vendor find, at any time, that existing conditions make modification in requirements desirable; it shall promptly report such matters to the Director of Procurement & Contracting or designee of the University, for consideration and decision.
- **E.** During the period of contract or any extension thereof, the University reserves the right to add or delete specific services.
- **F.** Stockton University may make changes in the general scope of the contract services provided by the vendor by written notice. The vendor shall promptly comply with the notice and shall bring all subsequent services in conformance with the notice.
- **G.** If any such changes causes a material increase or decrease in the vendor's cost of operation or the time required for attainment of required service levels, an equitable adjustment in the contract cost or time allotted for fulfillment of the contract shall be negotiated and the contract modified accordingly. Any change, alteration or modification of any contract will be valid and binding only if a submittal of a proposal, vendor hereby agrees to negotiate on good faith.
- **H.** The awarded vendor's engagement partner and/or manager might be required to meet periodically with the Contracting officer or his representative(s) to discuss services.

# II. VENDOR PERSONNEL

- **A.** While on University property:
  - **1.** All personnel shall observe all rules and regulations in effect at Stockton University governing safety and personal conduct.
  - **2.** Vendor employees shall be subject to control of the University, but under no circumstances, shall such persons be deemed employees of the University.
- **B.** Vendor personnel shall not represent themselves or be considered as employees of Stockton University or the State of New Jersey.
- C. CRIMINAL BACKGROUND CHECKS ARE MANDATORY for all non-university personnel performing work on the Stockton University Campus. Vendors, consultants, vendors and subcontractors are required to take all reasonable steps to assure that their employees do not represent a threat to the campus community. Failure to comply with this requirement may result in immediate termination of any award or contract. Background checks of any non-university personnel performing work on the campus, directly by the awarded vendor or any subcontractors of the awarded vendor, may be requested by the University. The awarded vendor shall produce any background checks as requested by the University.



- **D.** The Vendor shall be solely responsible for all damage or unauthorized destruction to any Stockton University buildings, equipment, premises or facilities; lease, lent, or in the care, custody or control of the University or State.
- **E.** The Vendor shall remove from the Stockton University campus or workplace, any of its employees who are found to be unacceptable by the University. Such requests will not be unreasonable.
- **F.** At all times, vendor personnel should be in appropriate attire with clear identification of the company's name, logo, and person's name.
- **G.** All vendor motorized vehicles should be identified with the company's name and/or logo in clear view.

#### III. VENDOR'S WARRANTY & REMEDIES FOR FAILURE TO COMPLY WITH CONTRACT REQUIREMENTS

- **A.** The awarded vendor is responsible for the quality, technical accuracy, timely completion and delivery of all deliverables and other services to be furnished by the Vendor under the Contract. The Vendor agrees to perform in a good, skillful and timely manner all services set forth in the Contract.
- **B.** The awarded vendor shall, without additional compensation, correct or revise any errors, omissions, or other deficiencies in its services and deliverables furnished under the Contract. The approval of interim deliverables furnished under the Contract shall not in any way relieve the awarded vendor of fulfilling all of its obligations under the Contract. The acceptance or payment for any of the services rendered under the Contract shall not be construed as a waiver by the University, of any rights under the agreement or of any cause of action arising out of the awarded vendor's performance of the Contract.
- **C.** The acceptance of, approval of, or payment for any of the services performed by the awarded vendor under the contract shall not constitute a release or waiver of any claim the University has or may have for latent defects or errors or other breaches of warranty or negligence.
- **D.** In the event that the awarded vendor fails to comply with any material Contract requirements, the University's Vice President for Administration and Finance and Chief Financial Officer may take steps to terminate the contract in accordance with the provisions herein and/or authorize the delivery of Contract items by any available means, with the difference between the price paid and the defaulting awarded vendor's price either being deducted from any monies due the defaulting Vendor or being an obligation owed the University by the defaulting Vendor.
- E. If the awarded vendor fails to timely and adequately perform the obligations under the Contract, Stockton, in its sole discretion, shall have the right to pursue a claim in a court of competent jurisdiction against the Vendor for any resulting compensatory damages and consequential damages, and recover any and all reasonable attorneys' fees, and costs including but not limited to court costs, witness costs and consultant costs incurred pursuing the claim.
- **F.** Nothing in this Section waives Stockton's right to seek equitable indemnity, and all other available legal remedies, for any claim.
- **G.** Any changes or modifications to the terms of the Contract shall be valid only when they have been reduced to writing and signed by the Vendor and the University's Vice President for Administration and Finance and Chief Financial Officer.



#### IV. DISPUTES, DISCREPANCIES AND PRECEDENCE OF SPECIAL CONTRACTUAL TERMS & CONDITIONS

#### A. Disputes:

- 1. The University shall be, in the first instance, the interpreter of the requirements of this contract and the impartial judge of the awarded vendor's performance hereunder. The awarded vendor may, at any time, request a conference of any claim, dispute or matter in question arising out of or relating to Contract. Consistent with the intent of this contract, the University may schedule a conference for the purpose of settling or resolving any such disputes, claims or other matters. Where such a conference is conducted, the awarded vendor shall be afforded the opportunity to be heard on the matter in question. The University may appoint a duly authorized University representative to act on the University's behalf.
- **2.** Following review of the awarded vendor's request, the University and the Vendor may settle or resolve the disputed matter. If an agreement cannot be reached, the final decision rendered by the authorized University representative as a result of the conference is binding. The final decision may be appealed to the Appellate Division pursuant to N.J.S.A. 18A:3B-6(f).

#### B. Discrepancies in Evaluating Proposals:

- 1. Discrepancies between words and figures will be resolved in favor of words
- 2. Discrepancies between unit prices and totals of unit prices will be resolved in favor of unit prices
- **3.** Discrepancies in the multiplication of units of work and unit prices will be resolved in favor of the unit prices
- **4.** Discrepancies between the indicated total of multiplied unit prices and units of work and the actual total will be resolved in favor of the actual total
- **5.** Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the corrected sum of the column of figures.

#### C. Precedence of Special Contractual Terms & Conditions

- 1. The Contract awarded as a result of this IFB shall consist of this IFB, all addendum to this IFB, the University's Standard Contract Terms and Conditions and the University's Service Provider Agreement incorporating these documents and signed by the Vendor and the University's Vice President for Administration and Finance and Chief Financial Officer or designee.
  - **a.** In the event of a conflict between provisions within the contract documents, the contract documents shall have the following order of priority:
    - Contract Agreement
    - IFB Addendum, by most recent issuance date
    - IFB Document
    - The University's Standard Contract Terms and Conditions

# V. ADDITIONAL WORK AND/OR SPECIAL PROJECTS

**A.** The awarded vendor shall not begin performing any additional work or special projects without first obtaining written approval from the University. In the event of additional work and/or special projects, the awarded vendor must present a written proposal to perform the additional work to the University. The proposal should provide justification for the necessity of the additional work. The relationship between the additional work and the base contract work must be clearly established by the awarded vendor in its proposal.



- **B.** The awarded vendor's written proposal must provide a detailed description of the work to be performed broken down by task and subtask. The proposal should also contain details on the level of effort, including hours, labor categories, etc., necessary to complete the additional work.
- C. The written proposal must detail the cost necessary to complete the additional work in a manner consistent with the Contract. The written price schedule must be based upon the hourly rates, unit costs or other cost elements submitted by the awarded vendor in the Vendor's original proposal submitted in response to this IFB. Whenever possible, the price schedule should be a firm, fixed price to perform the required work. The firm fixed price should specifically reference and be tied directly to costs submitted by the awarded vendor in its original proposal. A payment schedule, tied to successful completion of tasks and subtasks, must be included.
- **D.** No additional work and/or special project may commence without the University's written approval. In the event the awarded vendor proceeds with additional work and/or special projects without the University's written approval, it shall be at the awarded vendor's sole risk.

#### **VI. REPRESENTATIONS & WARRANTIES**

- A. The vendor has legal capacity to execute and perform any Agreement arising from this IFB.
- **B.** Any Agreement arising from the award of this IFB is a valid and binding Agreement, enforceable against the vendor according to its terms.
- **C.** The execution and performance of an Agreement by the vendor does not and will not violate or conflict with the terms of any existing Agreement or understanding of which the vendor is a party.
- **D.** The execution and performance of an Agreement by the vendor does not, and will not, violate or conflict with any law, rule, regulation, judgment or order of any court or other adjudicative entity binding the vendor.
- **E.** The vendor knows of no reason, or is any way physically, legally, or otherwise precluded from performing the obligations under an Agreement arising from this , in accordance with its terms; including without limitation those relating to health and safety.
- **F.** Such warranties shall survive and shall not be deemed waived by delivery or acceptance of, or payment for the goods and services.
- **G.** The Vendor warrants and represents that the items and/or services, when delivered, shall meet or exceed all applicable standards as mandated by State and Federal regulation.

#### VII. DEFAULT

**A.** In case of failure to deliver goods or services in accordance with the contract(s) terms and conditions, Stockton University, after due oral or written notice, may procure substitute goods or service from other sources and hold the vendor(s) responsible for any resulting additional purchasing and administrative costs. This remedy shall be in addition to any other solution, which Stockton University may have.

#### VIII. SUBMISSION ERRORS

**A.** A Vendor may request that its IFB proposal be withdrawn prior to IFB opening. Such request must be made, in writing, to the Director of Procurement & Contracting. If the request is granted, the Vendor may submit a revised IFB proposal as long as the revised IFB proposal is received prior to the announced date and time for the opening of IFB proposals and at the place specified.



- **B.** If, after the opening of IFB proposals, but before contract award, a Vendor discovers an error in its IFB proposal, the Vendor may make written request to the Director of Procurement & Contracting for authorization to withdraw its IFB proposal from consideration for award. Evidence of the Vendor's good faith in making this request shall be used in making the determination. The factors that will be considered are that the mistake is so significant that to enforce the contract resulting from the IFB proposal would be unconscionable; that the mistake relates to a material feature of the contract; that the mistake occurred notwithstanding the Vendor's exercise of reasonable care; and that the University will not be significantly prejudiced by granting the withdrawal of the IFB proposal.
- C. If, during the evaluation of IFB proposals received, an obvious pricing error made by a potential contract awardee is found, the Director of Purchasing shall issue written notice to the Vendor. The Vendor will have five days after receipt of the notice to confirm its pricing. If the Vendor fails to respond, its IFB proposal shall be considered withdrawn, and no further consideration shall be given it.
- **D.** If it is discovered that there is an arithmetic disparity between the unit price and the total extended price, the unit price shall prevail. If there is any other ambiguity in the pricing other than a disparity between the unit price and extended price and the Vendor's intention is not readily discernible from other parts of the IFB proposal, the University may seek clarification from the Vendor to ascertain the true intent of the IFB proposal.

#### IX. SUBCONTRACTING

**A.** Any Contract pursuant to this IFB shall not be subcontracted without the prior written approval from the Director of Procurement & Contracting to any other person, company, corporation, firm, organization or agency. At the time of proposing, the vendor shall submit a list of Subcontractors, the type of work performed, and other pertinent data so as to qualify the Subcontractor's capabilities.

#### X. SALE OR BANKRUPTCY OF BUSINESS

- **A.** If during the life of this Agreement, the awarded vendor disposes of its business by sale, transfer, force of law or by any means to another party, all obligations are transferred to such purchaser. In this event, the new owner(s) may, in Stockton University' discretion, be required to submit a performance bond in the amount of the value of services to be delivered pursuant to this Agreement.
- **B.** In the event of the institution of any proceedings by or against the awarded vendor, voluntarily or involuntarily, in bankruptcy or insolvency, or under the provisions of the Federal Bankruptcy Act, or for the appointment of a receiver or trustee or an assignee for the benefit of creditors of the property of the vendor, Stockton University shall have, in addition to the rights previously stated, the right to cancel this Agreement forthwith.

#### XI. INDEMNIFICATION

- **A.** The Vendor will indemnify, defend and hold harmless the University, its employees, representatives, and agents from and against any and all losses, suites, claims demands, fines, penalties, awards, damages, costs and expenses as well as reasonable attorney fees and court costs arising out of or in connection with:
  - **1.** Any negligence, default, breach, errors or omissions by the Vendor of obligations under this Contract; or



- 2. Violations or non-compliance with federal, State, local or municipal laws & regulations ordinances, building codes (including Americans with Disabilities Act, OSHA Environmental Protection Act) arising from the performance of this Contract or arising out of conditions created or caused to be created by the Vendor, its agents, employees and Subcontractors.
- **B.** The University is a State entity under and subject to the provisions of N.J.S.A. 18A:64-1 et seq. prohibiting it from providing indemnification to entities not specifically cited in N.J.S.A. 18A:64-82. Any Contract signed on behalf of the State of New Jersey by a State official shall be subject to all of the provisions of the New Jersey Tort Claims Act (N.J.S.A. 59:1-1 et seq.), the New Jersey Contractual Liability Act (N.J.S.A. 59:13-1 et seq.), and the availability of appropriations.
- **C.** Vendor shall reimburse, and make good to the University all monies, which the University or its representatives shall pay, or cause to be paid, or become liable to pay, by reason of such claims, or in connection with any litigation, investigation or other matters connected therewith.
- **D.** This indemnification obligation is not limited by, but is in addition to the insurance obligations contained in this agreement.

#### XII. INSURANCE

- A. Vendor agrees to obtain and maintain, at its sole expense, the insurance coverage described below. All insurance must be placed with an insurance company licensed to conduct business in the State of New Jersey and maintaining an A.M Best Rating of "A" or better with a financial size rating of Class XI or larger. All insurance required herein shall be written on an Occurrence basis, unless otherwise noted, shall contain a waiver of subrogation in favor of Stockton University and the State of New Jersey, and will be in effect no later than 12:01 A.M. at the start of the day of the contract and must remain in effect for the duration of the contract, including any extensions.
- **B.** Vendor agrees that no insurance policy will be cancelled, reduced, or revised without thirty (30) days prior written notice to Stockton University. In addition, required insurance will be primary to any other insurance available and any limitations of Vendor's insurance will not relieve the Vendor of its indemnification responsibilities to Stockton University and the State of New Jersey per the *Indemnity* section of this project.
- **C.** All such policies shall name Stockton University and the State of New Jersey as "Additional Insured." The New Jersey Educational Facilities Authority shall also be named as an additional insured for buildings in which their interests appear.
- **D.** The Vendor shall show evidence of, prior to the commencement of services, and maintain, at its own expense, until final acceptance by the University of all services required under the Agreement, insurance for liability for damages imposed by law and assumed under the Agreement, of the kinds and in the amounts hereinafter provided, with insurance companies authorized to do business in the State of New Jersey. The University prohibits capping liability to anything less than the liability insurance coverage.
- **E.** The Vendor shall procure and maintain the below listed types of insurance with limits of liability in at least the amounts also listed below:
  - Workers' Compensation Insurance with statutory limits applicable to the laws of the State of New Jersey and any other State or Federal jurisdiction required to protect the employees of Vendor who will be engaged in the performance of work under this contract.



- 2. Employers' Liability Protection with a limit of liability not less than one million dollars (\$1,000,000) bodily injury, each occurrence; one million dollars (\$1,000,000) disease, each employee; and one million dollars (\$1,000,000) disease, aggregate limit.
- 3. Commercial General Liability written on a current ISO Occurrence Form or equivalent. The General Liability policy will include, but not be limited to, coverage for bodily injury (including death) and property damage arising from premises and operations liability, products and completed operations liability, personal injury and advertising liability, sexual abuse and molestation, contractual liability, and fire legal liability. Vendor agrees to maintain the following general liability limits of coverage:
  - a. Per Occurrence: \$1,000,000
  - b. Products/Completed Operations Aggregate: \$2,000,000
  - c. Personal and Advertising Injury: \$1,000,000
  - **d.** General Aggregate: \$2,000,000 (Note: a "per location or project" endorsement shall be included to ensure the general aggregate limit applies separately to the Stockton location or project.)
- **4.** Comprehensive Automobile Liability written on an occurrence basis covering owned, non-owned, and hired vehicles. The limits of liability shall not be less than a combined single limit of one million dollars (\$1,000,000) per occurrence.
- **5.** Excess Liability, umbrella insurance, follow form, applying excess of the commercial general liability, commercial automobile liability and employer's liability insurance in minimum amounts of ten million dollars (\$10,000,000) per occurrence, ten million dollars (\$10,000,000) general aggregate, and ten million dollars (\$10,000,000) products/completed operations.
- Security Liability, and Regulatory Liability; 2) Payment Card Industry (PCI) Fines, Penalties, and Assessments; 3) Breach Response Costs including Data Forensics, Public Relations, and Privacy Counsel, and 4) Notification, Credit Monitoring, and Identity Theft Restoration Costs. Limits of liability will be in minimum amounts of five million dollars (\$5,000,000). If this policy is written on a claims-made policy form, Vendor agrees that upon termination of the claims-made policy a retroactive reporting policy (tail policy) will be purchased to provide coverage for events that occurred prior to the termination date of the claims-made coverage and are not reported until after the termination date.
- **7.** Pollution Legal Liability insurance policy, if applicable to the services performed under this contract, in minimum amounts of two million dollars (\$2,000,000) per occurrence. If this policy is written on a claims made policy form, Vendor agrees that upon termination of the claims made policy a retroactive reporting policy (tail policy) will be purchased to provide coverage for losses that occurred during, or as a result of, the provision of Vendor's services under this contract, but are not discovered until after completion of services under this contract.
- 8. Professional (Errors & Omissions) Liability insurance, if applicable, in minimum amounts of two million dollars (\$2,000,000) per claim. If this policy is written on a claims-made policy form, Vendor agrees that upon termination of the claims-made policy a retroactive reporting policy (tail policy) will be purchased to provide coverage for losses that result from the professional services provided during the term of this contract regardless of when a claim is made.
- **F.** Vendor shall bear all costs of all policy deductibles.



- **G.** Vendor may, if they so desire, include with their proposal the applicable certificates of insurance or upon request by the University. This will expedite the contract award process for the awarded vendor.
- **H.** Within ten (10) days after receipt of notice of intent to award contract and prior to the commencement of work, and if applicable, annually thereafter until contract termination. Vendor will furnish Stockton University with Certificates of Insurance evidencing all required insurance.
  - 1. Certificates must evidence the Additional Insured language.
  - 2. Certificates will be submitted to the Director of Procurement & Contracting, Stockton University, 101 Vera King Farris Drive, Galloway, NJ 08205.
- I. The awarded vendor shall assume all responsibility for its actions and those of anyone else working for it while engaged in or traveling to or from any activity connected with this agreement. The successful Vendor agrees to defend, indemnify, and hold harmless Stockton University and its officers, agents, staff members and employees, from all actions, claims, and demands whatsoever that may be asserted by, or on behalf of anyone, against the University, its officers, agents, staff members and employees because or as a result of, any accident, injury or illness that may occur to or be sustained by any person, agency, or company that arises out of the activities conducted under this IFB by the Vendor, their employees or anyone acting on the Vendor's behalf.
- J. Stockton University, as a State funded University, will not indemnify vendors in any form.

#### XIII. DIANE B. ALLEN EQUAL PAY ACT

A. Please be advised that in accordance with P.L. 2018, c. 9, also known as the Diane B. Allen Equal Pay Act, which was signed into law by Governor Phil Murphy on April 24, 2018, a vendor performing "qualifying services" or "public work" to the State or any agency or instrumentality of the State shall provide the Commissioner of Labor and Workforce Development a report regarding the compensation and hours worked by employees categorized by gender, race, ethnicity, and job category. For more information and report templates see https://nj.gov/labor/equalpay/equalpay.html

#### **XIV. AFFIRMATIVE ACTION**

**A.** The vendor recommended for contract award is required to submit a copy of its Certificate of Employee Information or a copy of Federal Letter of Approval, verifying that the Vendor is operating under a federally approved or sanctioned Affirmative Action program. If the vendor has neither document of Affirmative Action evidence, then the Vendor must complete an Affirmative Action Employee Information Report (AA-302). This requirement is a precondition to entering into a University contract.



#### XV. SET-OFF FOR STATE TAX

- A. Please be advised that, pursuant to P.L. 1995, c. 159, effective January 1, 1996 and codified at N.J.S.A. 54:49-19 and N.J.S.A. 54:49-20, and notwithstanding any provision of the law to the contrary, whenever any taxpayer, partnership or S Corporation under contract to provide goods or services or construction projects to the State of New Jersey or its agencies or instrumentalities, including the legislative and judicial branches of State government, is entitled to payment for those goods and services or construction projects, at the same time a taxpayer, partner or shareholder of that entity is indebted for an State tax, which pursuant to N.J.S.A. 43:21-14.4 also includes any indebtedness greater than or equal to \$300 that is due to the Unemployment Compensation Fund, the State Disability Benefits Fund, and the Family Temporary Disability Leave Account, the Director of the Division of Taxation of the Office of Management and Budget shall seek to set-off that taxpayer's, partner's or shareholder's share of the payment of that indebtedness.
- **B.** The amount set-off shall not allow for the deduction of any expenses or other deductions which might be attributable to the taxpayer partner or shareholder subject to set-off.
- **C.** The Division of Taxation may initiate procedures to set-off the tax debt of a specific vendor upon the expiration of ninety (90) days after either the issuance by the Division of a notice and demand for payment of any Sate tax owed by the taxpayer or the issuance by the Division of a final determination on any protest filed by the taxpayer against an assessment or final audit determination. A set-off reduces the contract payment due to a vendor by the amount of that vendor's State tax indebtedness or, in the case of a vendor-partnership or vendor-S Corporation, by the amount of State tax indebtedness of any member-partner or shareholder of the partnership or S Corporation, respectively. N.J.A.C. 18:2-8.3.
- **D.** The Director of the Division of Taxation shall give notice of the set-off to the taxpayer, partner or shareholder and shall provide an opportunity for a hearing within thirty (30) days of such notice under the procedures for protests established under N.J.S.A. 54:49-18. No requests for conference, protest or subsequent appeal to the Tax Court from any protest permitted under N.J.S.A. 54:49-19 shall stay the collection of the indebtedness. Interest that may be payable by the State to the taxpayer, pursuant to P.L. 1987, c. 184 (N.J.S.A. 52:32-35) shall be stayed.

#### XVI. STOCKTON UNIVERSITY GENERAL CONDITIONS

- A. Stockton University may need to issue one or more addenda related to this project. Any addenda will become part of this IFB and part of any contract awarded as a result of this IFB. All addenda will be posted on the Stockton Procurement website. It will be the sole responsibility of the prospective vendors and other interested parties to familiarize themselves with the website and visit it regularly during the IFB process for updated information or addenda related to this project.
- **B.** The intent to award will be sent in writing (via email) to all firms that submitted a proposal, naming the selected firm. It will be sent to the designation listed on the Proposal Page of this IFB under the section "Primary Contact for Project."
- **C.** Short procedural inquiries may be accepted by telephone by the buyer noted for this project. However, oral explanations or instructions given over the telephone shall not be binding upon the University. Firms shall not contact any person within the University directly, in person, or by telephone, other than the assigned buyer, concerning this project.
- **D.** If a joint venture is submitting an IFB, the agreement between the parties relating to such joint venture shall be submitted with the joint venture's submission.



- **E.** Submissions which, in the sole judgment of Stockton, fail to meet the requirements of the IFB or which are in any way conditional, incomplete, obscure, contain additions, deletions, strikethroughs or contain errors may be rejected.
- **F.** The awarded vendor shall not transfer, assign or otherwise dispose of the Contract or Contract funds, due or to become due, or claims of any nature it has against the University to any other party except upon the express written approval of the University.
- **G.** Stockton reserves the right to negotiate the terms and conditions of the contract to obtain the most advantageous situation for Stockton.
- **H.** Stockton reserves the right to suspend or terminate the procurement process described in this IFB at any time (in its sole discretion). If terminated, Stockton may determine to commence a new procurement process or exercise any other rights provided under applicable law without any obligation to the Respondents.
- I. Patents: The Suppliers shall hold and save the University, its officers, agents, and employees harmless from liability of any nature or kind, including cost and expense for or on account of any patented or unpatented invention, article, or applicable manufacturer or use in materials and forms of construction as will satisfy the University's requirements.
- J. Submission as Public Information and Property of Stockton. Ownership of all data, material, and documentation originated and prepared for the University pursuant to this IFB and ensuing Contract shall become the remain the property of the University.
- K. Subsequent to IFB opening, all information submitted by a Vendor in the proposal is considered public information, except as may be exempted from public disclosure by the Open Public Records Act (OPRA), N.J.S.A. 47:1A-1 et seq., and the common law. A Vendor may designate specific information in its proposal as not subject to disclosure when the Vendor has a good faith legal/factual basis for such assertion. The University reserves the right to make the determination and will advise the Vendor accordingly. The location in the proposal of any such designation should be clearly stated in a cover letter. The University will not honor any attempt by a Vendor to either to designate its entire submission as proprietary and/or to claim copyright protection for its entire proposal.
- L. In submitting a proposal, the Vendor agrees, unless specifically authorized in writing by an authorized representative of Stockton University on a case by case basis, that it shall have no right to use, and shall not use, the name of Stockton University, its officials or employees, or the Seal of the University:
  - **1.** In any advertising, publicity, promotion.
  - 2. To express or imply any endorsement of agency's services.
  - **3.** To use the name of the State, its officials or employees or the University seal in any manner (whether or not similar to uses prohibited by (a) and (b) above) except only to manufacture and deliver in accordance with this agreement such services as are hereby contracted by the University.
- **M.** The preparation of an IFB submission shall be at the expense of the respondent. Stockton University assumes no responsibility and bears no liability for costs incurred in the preparation and submittal of an IFB. The University will not reimburse firms for any costs associated with the preparation or submittal of a response.
- **N.** Stockton University does not allow payment of attorney fees for litigation regardless of disposition of matter.



- **O.** By responding to this IFB, firms acknowledge and consent to the conditions set forth herein relative to the submission, review and consideration of your response.
- **P.** Stockton University will not accept jurisdiction in any State except New Jersey.
- **Q.** Stockton University reserves the right to reject any or all submissions or to award in whole or in part if deemed in the best interest of the University to do so.
- **R.** This IFB is not binding on the University.
- **S.** Protest of restrictive specifications or improprieties in the solicitation, by an interested party, must be received by the Procurement Department in writing not less than ten (10) working days before the closing date for receipt of submissions.
- **T.** The Vendor is required to carefully examine the scope of services in this IFB; including, but not limited to any specifications, drawings or supplemental materials, and to compute the quantities of labor or material entering therein, and to determine the difficulties incidental to the prosecution of the work, and the presentation of a IFB shall be considered as conclusive evidence of such examination.
- **U.** Vendors assume sole responsibility for the complete effort required in submitting a proposal in response to this IFB. No special consideration shall be given after submissions are opened because of a vendor's failure to be knowledgeable of all the requirements of this IFB. By submitting a proposal in response to this offering, the vendor represents that it has satisfied itself, from its own investigation, of all the requirements of this IFB.
- **V.** Stockton University has the option, in its sole discretion, to reduce the scope of work for any task or subtask called for under this contract. In such an event, the Director of Procurement & Contracting shall provide advanced, written notice to the vendor.
- W. Upon receipt of such written notice, the vendor will submit, within five (5) working days to the Director of Procurement & Contracting, an itemization of the work effort already completed by task or subtasks. The vendor shall be compensated for such work effort according to the applicable portions of its cost proposal.
- X. The Director of Procurement & Contracting may, for valid reason, issue a stop order directing the vendor to suspend work under the contract for a specific time. The vendor shall be paid until the effective date of the stop order. The vendor shall resume work upon the date specified in the stop order or upon such other date as the Director of Procurement & Contracting may thereafter direct in writing. The period of suspension shall be deemed added to the vendor's approved schedule of performance. The Director of Procurement & Contracting and the vendor shall negotiate an equitable adjustment, if any, to the contract price.
- Y. No party, including any respondent to this IFB, is granted any rights hereunder.
- **Z.** The IFB submitted by the vendor shall be binding on the vendor.
- **AA.** Stockton University reserves the right to seek clarification and additional information at any point in connection with vendor information or other communication regarding this IFB.

IFB 22-20

HVAC Renovations: Building 70



#### **XVII. PRICE & PAYMENT GENERAL**

- A. Price Fluctuation During Contract: Unless otherwise agreed to in writing by the University, all prices quoted shall be firm through issuance of contract or purchase order and shall not be subject to increase during the period of the contract. In the event of a manufacturer's or vendor's price decrease during the contract period, the University shall receive the full benefit of such price reduction on any undelivered purchase order and on any subsequent order placed during the contract period. The Director of Procurement & Contracting must be notified, in writing, of any price reduction within five (5) days of the effective date. Failure to report price reductions may result in cancellation of contract for cause.
- **B.** Availability of Funds: The University's obligation to make payment under this contract is contingent upon the availability of appropriated funds and receipt of revenues from which payment for contract purposes can be made. No legal liability on the part of the University or the State of New Jersey for payment of any money shall arise unless and until funds are appropriated each fiscal year to the using agency and made available through receipt of revenue.

#### **XVIII. EXCEPTIONS TO TERMS & CONDITIONS**

- **A.** A responder shall be presumed to be in agreement with the terms and conditions of this IFB unless it takes specific exception to one or more of the conditions.
- **B.** Submission by the responder of its proposed language shall not be viewed as an exception unless the responder specifically states in the response that its proposed changes are intended to supersede the terms and conditions of this IFB.
- **C.** Responders are cautioned that by taking any exception they may be materially deviating from the IFB. If a responder materially deviates from the general terms, conditions and instructions, then its proposal may be rejected.

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# TERMS & CONDITIONS SPECIFIC TO NEW JERSEY STATE LAW REQUIRING MANDATORY COMPLIANCE BY ALL VENDORS

Stockton University is an agency of the State of New Jersey thus requiring University compliance with all State regulations. The statutes, laws or codes cited herein are available for review at the New Jersey State Library, 185 West State Street, Trenton, New Jersey 08625.

Where conflict among the compliance requirements or with these specifications exists the most stringent requirements shall be utilized. The most recent edition of any relevant regulation, standard, document, or code shall be in effect.

It is agreed and understood that any contracts and/or orders placed as a result of this proposal shall be governed and construed and the rights and obligations of the parties hereto shall be determined in accordance with the laws of the State of New Jersey.

#### I. BUSINESS REGISTRATION

- **A.** Pursuant to N.J.S.A. 52:32-44, the University is prohibited from entering into a contract with an entity unless the Vendor and each subcontractor named in the proposal have a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services. A subcontractor named in an IFB or other proposal shall provide a copy of its business registration to the Vendor who shall provide it to the University.
- **B.** The vendor shall maintain and submit to the University a list of subcontractors and their addresses that may be updated from time to time with the prior written consent of the Director during the course of contract performance. The vendor shall submit to the University a complete and accurate list of all subcontractors used and their addresses before final payment is made under the contract.
- **C.** Pursuant to N.J.S.A. 54:49-4.1, a business organization that fails to provide a copy of a business registration, or that provides false business registration information, shall be liable for a penalty of \$25 for each day of violation, not to exceed \$50,000 for each business registration copy not properly provided under a contract with a contracting agency.
- **D.** The vendor and any subcontractor providing goods or performing services under the contract, and each of their affiliates, shall, during the term of the contract, collect and remit to the Director of the Division of Taxation in the Department of the Treasury, the Use Tax due pursuant to the Sales and Use Tax Act, P.L. 1966, c. 30 (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into the University. Any questions in this regard can be directed to the Division of Revenue at (609) 292-1730. Form NJ-REG can be filed online <a href="here">here</a>.

#### II. ANTI-DISCRIMINATION

A. All parties to any contract with the University agree not to discriminate in employment and agree to abide by all anti-discrimination laws including those contained within N.J.S.A. 10:2-1 through N.J.S.A. 10:2-4, N.J.S.A. 10:5-1 et seq. and N.J.S.A. 10:5-31 through 10:5-38, and all rules and regulations issued thereunder are hereby incorporated by reference. The agreement to abide by the provisions of N.J.S.A. 10:5-31 through 10:5-38 include those provisions indicated for Goods, Professional Service and General Service Contracts (Exhibit A, attached) and Constructions Contracts (Exhibit B and Executive Order 151, August 28, 2009, attached) as appropriate.



**B.** The vendor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time.

#### III. PREVAILING WAGE ACT

- A. The New Jersey Prevailing Wage Act, N.J.S.A. 34: 11-56.25 et seq. is hereby made part of every contract entered into on behalf of the University, except those contracts which are not within the contemplation of the Act. The Vendor's signature on this proposal is their guarantee that neither they nor any subcontractor(s) they might employ to perform the work covered by this proposal has been suspended or debarred by the Commissioner, Department of Labor and Workforce Development for violation of the provisions of the Prevailing Wage Act and/or the Public Works Vendor Registration Acts; the Vendor's signature on the proposal is also their guarantee that they and any subcontractor(s) they might employ to perform the work covered by this proposal shall comply with the provisions of the Prevailing Wage and Public Works Vendor Registration Acts, where required.
- **B.** The New Jersey Prevailing Wage Act (N.J.S.A. 34:11-56.25 et seq.) requires that the Department of Labor and Workforce Development establish and enforce a prevailing wage level for workers engaged in public works in order to safeguard their efficiency and general well-being and to protect them as well as their employers from the effects of serious and unfair competition.
- C. Prevailing wage rates are wage and fringe benefit rates based on the collective bargaining agreements established for a particular craft or trade in the locality in which the public work is performed. In New Jersey, these rates vary by county and by the type of work performed. Applicable prevailing wage rates are those wages and fringe benefits in effect on the date the contract is awarded. All pre-determined rate increases listed at the time the contract is awarded must also be paid, beginning on the dates specified. Rates that have expired will remain in effect until new rates are posted.
- **D.** The prevailing wage rate for each craft will list the effective date of the rate and the following information:
  - 1. W = Wage Rate per Hour
  - **2.** B = Fringe Benefit Rate per Hour
    - Fringe benefits are an integral part of the prevailing wage rate. Employers not providing such benefits must pay the fringe benefit amount directly to the employee each payday.
    - Employers providing benefits worth less than the fringe benefit amount must pay the balance directly to the employee each payday.
    - Unless otherwise stated in the Prevailing Wage Rate Determination, the fringe benefit rate for overtime hours remains at the straight time rate.
  - 3. T = Total Rate per Hour
- **E.** When the Overtime Notes in the Prevailing Wage Rate Determination state that the overtime rates are "inclusive of benefits," the benefit rate is increased by the same factor as the wage rate (i.e. multiplied by 1.5 for time and one-half, multiplied by 2 for double time, etc.).
- **F.** Apprentice Rate Schedule An "apprentice" is an individual who is registered with the United States Department of Labor Office of Apprenticeship and enrolled in a certified apprenticeship program during the period in which they are working on the public works project.



- **G.** The apprentice <u>wage</u> rate is a percentage of the journeyman wage rate, unless otherwise indicated. The apprentice benefit rate is the full journeyman benefit rate, unless otherwise indicated.
- **H.** If there is no apprentice rate schedule listed, the individual must be paid at least the journeyman rate even if that individual is in a certified apprentice program for that trade.
- I. If there is no ratio of apprentices to journeymen listed for a particular craft, then the ratio shall be one (1) apprentice to every four (4) journeymen.
- J. The Public Works Vendor Registration Act (N.J.S.A. 34:11-56.48) requires that all vendors, subcontractors, or lower tier subcontractors who are working on or who bid on public works projects register with the Department of Labor and Workforce Development. Applications are available at <a href="https://www.nj.gov/labor">www.nj.gov/labor</a> (click on Wage & Hour and then go to Registration & Permits).
- **K.** Pursuant to N.J.S.A. 34:11-56.51: No vendor shall bid on any contract for public work as defined in section 2 of P.L.1963, c. 150 (C.34:11-56.26) unless the vendor is registered pursuant to this act. No vendor shall list a subcontractor in a bid proposal for the contract unless the subcontractor is registered pursuant to P.L.1999, c.238 (C.34:11-56.48 et seq.) at the time the bid is made. No vendor or subcontractor, including a subcontractor not listed in the bid proposal, shall engage in the performance of any public work subject to the contract, unless the vendor or subcontractor is registered pursuant to that act.
- **L.** Snow plowing contracts are not subject to the New Jersey Prevailing Wage Act or the Public Works Vendor Registration Act.

#### IV. AMERICANS WITH DISABILITIES ACT

**A.** The vendor must comply with all provisions of the Americans with Disabilities Act (ADA), P.L 101-336, in accordance with 42 U.S.C. 12101, et seq.

#### V. RIGHT TO AUDIT

**A.** Pursuant to N.J.A.C. 17:44-2.2, Stockton University and the State, including the Office of the Comptroller, has the authority to audit or review contract records that are relevant records of private vendors or other persons entering into contracts with covered entities are subject to audit or review by OSC pursuant to N.J.S.A. 52:15C-14(d).

#### **VI. MAINTENANCE OF RECORDS**

**A.** The vendor shall maintain records for products and/or services delivered against the contract for a period of five (5) years from the date of final payment unless otherwise specified in the IFB. Such records shall be made available to the University and the State, including the Comptroller, for audit and review.



#### **VII. PAY TO PLAY PROHIBITIONS**

**A.** Pursuant to N.J.S.A. 19:44A-20.13 et seq. (P.L. 2005, c. 51), and specifically, N.J.S.A. 19:44A-20.21, it shall be a breach of the terms of the contract for the business entity to:

- 1. Make or solicit a contribution in violation of the statute;
- 2. Knowingly conceal or misrepresent a contribution given or received;
- **3.** Make or solicit contributions through intermediaries for the purpose of concealing or misrepresenting the source of the contribution;
- **4.** Make or solicit any contribution on the condition or with the agreement that it will be contributed to a campaign committee or any candidate of holder of the public office of Governor or Lieutenant Governor, or to any State or county party committee;
- **5.** Engage or employ a lobbyist or consultant with the intent or understanding that such lobbyist or consultant would make or solicit any contribution, which if made or solicited by the business entity itself, would subject that entity to the restrictions of the Legislation;
- **6.** Fund contributions made by third parties, including consultants, attorneys, family members, and employees;
- 7. Engage in any exchange of contributions to circumvent the intent of the Legislation; or
- **8.** Directly or indirectly through or by any other person or means, do any act which would subject that entity to the restrictions of the Legislation.

#### VIII. POLITICAL CONTRIBUTION DISCLOSURE

A. The vendor is advised of its responsibility to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC), pursuant to N.J.S.A. 19:44A-20.27 (P.L. 2005, c. 271, §3 as amended) if in a calendar year the vendor receives one (1) or more contracts valued at \$50,000.00 or more. It is the vendor's responsibility to determine if filing is necessary. Failure to file can result in the imposition of penalties by ELEC. Additional information about this requirement is available from ELEC by calling 1(888)313-3532 or online at <a href="http://www.elec.state.nj.us/">http://www.elec.state.nj.us/</a>.

#### IX. OWNERSHIP DISCLOSURE

**A.** Pursuant to N.J.S.A. 52:24.2, in the event the vendor is a corporation, partnership or sole proprietorship, the vendor must disclose their ownership.

#### X. STANDARDS PROHIBITING CONFLICTS OF INTEREST

The following prohibitions on vendor activities shall apply to all contracts or purchase agreements made with the University pursuant to Executive Order No. 189 (1988).

**A.** No vendor shall pay, offer to pay, or agree to pay, either directly or indirectly, any fee, commission, compensation, gift, gratuity, or other thing of value of any kind to any State officer or employee or special State officer or employee, as defined by N.J.S.A. 52:13D-13b. and e., in the Department of the Treasury or any other agency with which such vendor transacts or offers or proposes to transact business, or to any member of the immediate family, as defined by N.J.S.A. 52:13D-13i., of any such officer or employee, or partnership, firm or corporation with which they are employed or associated, or in which such officer or employee has an interest within the meaning of N.J.S.A. 52: 13D-13g;



- **B.** The solicitation of any fee, commission, compensation, gift, gratuity or other thing of value by any State officer or employee or special State officer or employee from any State vendor shall be reported in writing forthwith by the vendor to the New Jersey Office of the Attorney General and the Executive Commission on Ethical Standards;
- C. No vendor may, directly or indirectly, undertake any private business, commercial or entrepreneurial relationship with, whether or not pursuant to employment, contract or other agreement, express or implied, or sell any interest in such vendor to, any University officer or employee, State officer or employee or special State officer or employee having any duties or responsibilities in connection with the purchase, acquisition or sale of any property or services by or to any State agency or any instrumentality thereof, or with any person, firm or entity with which he/she is employed or associated or in which he/she has an interest within the meaning of N.J.S.A. 52:130-13g. Any relationships subject to this provision shall be reported in writing forthwith to the Executive Commission on Ethical Standards, which may grant a waiver of this restriction upon application of a University officer or employee, State officer or employee or special State officer or employee upon a finding that the present or proposed relationship does not present the potential, actuality or appearance of a conflict of interest;
- **D.** No vendor shall influence, or attempt to influence or cause to be influenced, any University officer or employee, State officer or employee or special State officer or employee in his/her official capacity in any manner which might tend to impair the objectivity or independence of judgment of said officer or employee;
- E. No vendor shall cause or influence, or attempt to cause or influence, any University officer or employee, State officer or employee or special State officer or employee to use, or attempt to use, his/her official position to secure unwarranted privileges or advantages for the vendor or any other person; and
- **F.** The provisions cited above shall not be construed to prohibit a University officer or employee, State officer or employee or special State officer or employee from receiving gifts from or contracting with vendors under the same terms and conditions as are offered or made available to members of the general public subject to any guidelines the Executive Commission on Ethical Standards may promulgate under paragraph 3c of Executive Order No. 189.

#### **XI. TAX CHARGES**

**A.** Stockton University is exempt from State sales or use taxes and Federal excise taxes. Therefore, price quotations must not include such taxes. The State's Federal Excise Tax Exemption number is

#### XII. <u>NEW JERSEY PROMPT PAYMENT ACT</u>

**A.** The New Jersey Prompt Payment Act, N.J.S.A. 52:32-32 et seq., requires state agencies to pay for goods and services within 60 days of receipt and acceptance of goods and/or services.



# TERMS & CONDITIONS SPECIFIC TO NEW JERSEY STATE LAW REQUIRING MANDATORY COMPLIANCE BY VENDORS UNDER CIRCUMSTANCES SET FORTH IN LAW OR BASED ON THE TYPE OF CONTRACT

#### I. COMPLIANCE CODES AND WITH LAWS & STANDARDS

- **A.** The awarded vendor is responsible for assuring that all applicable federal, state and local laws, statutes, regulations, codes, and standards, and current generally-accepted standards and practices in its profession are complied with in connection with the services rendered to the University under this Contract.
- **B.** The awarded vendor must comply with NJUCC and the latest NEC70, B.O.C.A. Basic Building code, OSHA and all applicable codes for this requirement. The vendor shall be responsible for securing and paying all necessary permits, where applicable.

#### II. PUBLIC WORKS VENDOR REGISTRATION ACT

A. The New Jersey Public Works Vendor Registration Act requires all vendors, subcontractors and lower tier subcontractor(s) who engage in any contract for public work as defined in N.J.S.A. 34:11-56.26 be first registered with the New Jersey Department of Labor and Workforce Development pursuant to N.J.S.A. 34:11-56.51. Any questions regarding the registration process should be directed to the Division of Wage and Hour Compliance at (609) 292-9464.

#### III. BUILDING SERVICE

**A.** Pursuant to N.J.S.A. 34:11-56.58 et seq., in any contract for building services, as defined in N.J.S.A. 34:11-56.59, the employees of the vendor or subcontractors shall be paid prevailing wage for building services rates, as defined in N.J.S.A. 34:11.56.59. The prevailing wage shall be adjusted annually during the term of the contract.

#### IV. THE WORKER AND COMMUNITY RIGHT TO KNOW ACT

**A.** The provisions of N.J.S.A. 34:5A-1 et seq. which require the labeling of all containers of hazardous substances are applicable to this contract. Therefore, all goods offered for purchase to the University must be labeled by the vendor in compliance with the provisions of the statute.

#### V. SERVICE PERFORMANCE WITHIN U.S.

- **A.** Under N.J.S.A. 52:34-13.2, all contracts primarily for services awarded by the Director of Procurement & Contracting shall be performed within the United States, except when the Director of Procurement & Contracting certifies in writing a finding that a required service cannot be provided by a vendor or subcontractor within the United States and the certification is approved by the New Jersey State Treasurer.
- **B.** A shift to performance of services outside the United States during the term of the contract shall be deemed a breach of contract. If, during the term of the contract, the vendor or subcontractor, proceeds to shift the performance of any of the services outside the United States, the vendor shall be deemed to be in breach of its contract, which contract shall be subject to termination for cause pursuant to of the Terms and Conditions provided, unless previously approved by the Director of Procurement & Contracting and the State Treasurer.

# RENOVATIONS TO

# STOCKTON UNIVERSITY BUILDING 70

101 VERA KING FARRIS DRIVE GALLOWAY, NEW JERSEY

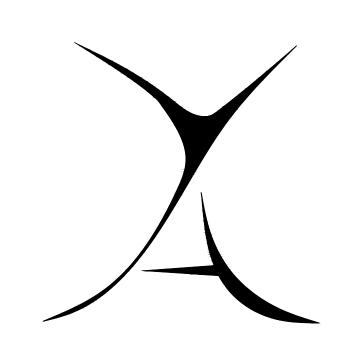


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INTERIORS - ADMINISTRATION
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TOMS RIVER, NJ 08754

TEL: (732) 240-3433

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BLDG. 70 ELECTRICAL NEW WORK PLAN

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Architect No. 73872

STOCKTON UNIVERSITE GALLOWAY CAMPUS BUILDING 70

IN VERA KING FARRIS DRIVE GALLOWAY, NEW JERSEY

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ovisions By Date

Sheet Title

COVER SHEET

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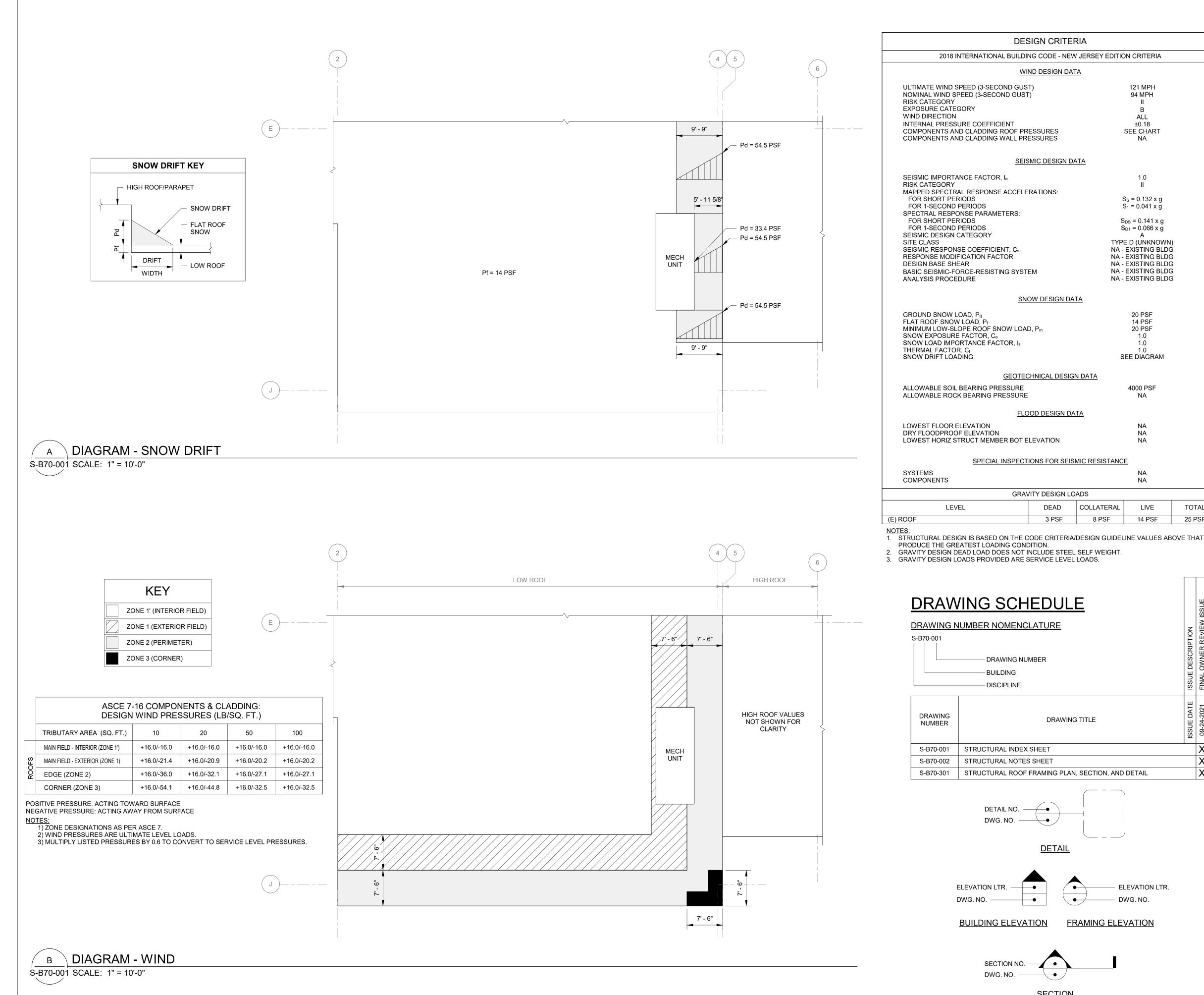
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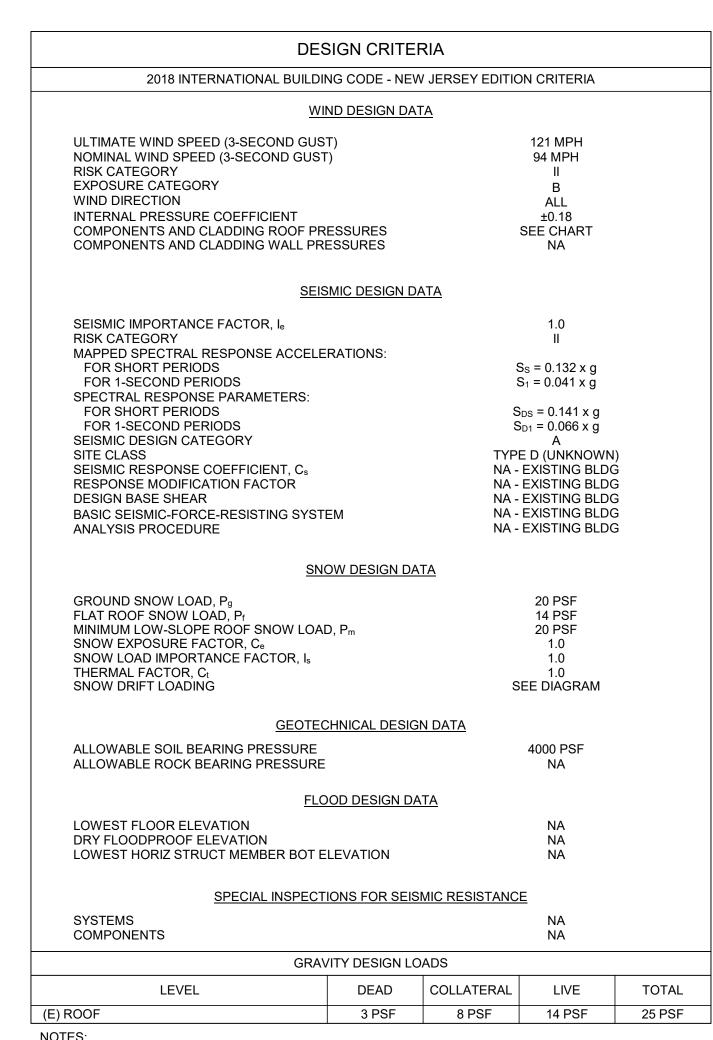
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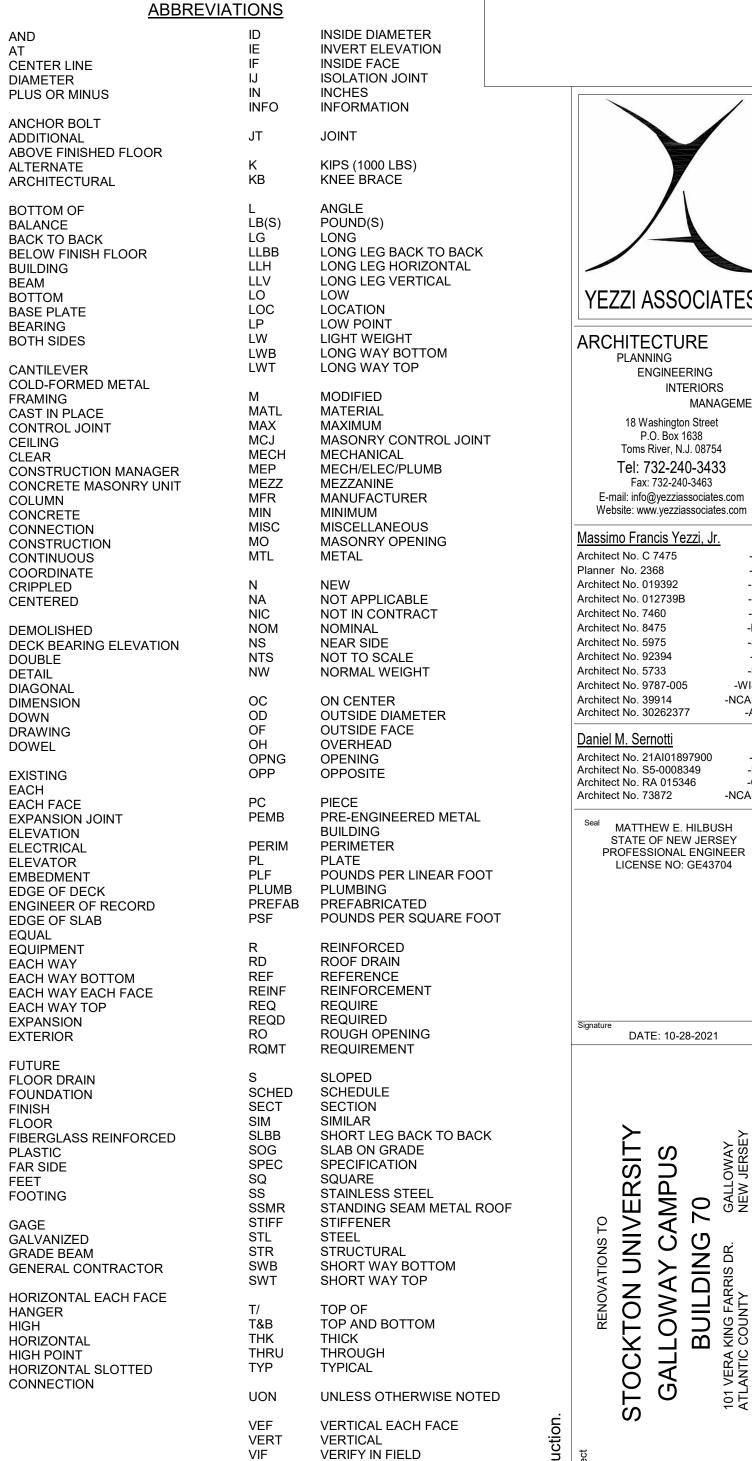
# STRUCTURAL INDEX SHEET





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**ISSUE** 



**CENTER LINE** 

PLUS OR MINUS

ANCHOR BOLT ADDITIONAL

ALTERNATE

BOTTOM OF

BACK TO BACK

**BELOW FINISH FLOOR** 

COLD-FORMED METAL

BALANCE

BUILDING

BOTTOM

BEARING

FRAMING

CEILING

CONCRETE

CONNECTION

CONTINUOUS

COORDINATE

CRIPPLED

CENTERED

DOUBLE

DIAGONA

DIMENSION

DRAWING

**EXISTING** 

EACH FACE

ELEVATION

ELECTRICAL

**EMBEDMENT** 

EDGE OF DECK

EDGE OF SLAB

EACH WAY TOP

**EXPANSION** 

FLOOR DRAIN

**FOUNDATION** 

FAR SIDE

**FOOTING** 

GALVANIZED

HORIZONTAL

HIGH POINT

GRADE BEAM

FEET

**EACH WAY BOTTOM** 

**EACH WAY EACH FACE** 

ELEVATOR

**EQUIPMENT** 

**EXPANSION JOINT** 

DETAIL

DOWN

DOWEL

FACH

DEMOLISHED

CONSTRUCTION

CLEAR

BASE PLATE

CANTILEVER

CAST IN PLACE

CONTROL JOINT

BLDG

BASE PL

BRG

CLR

CMU

COL

CONC

CONN

CONST

COORD

CONT

CTRD

DIAG

DWL

ELEC

ELEV

EOR

EOS

FTG

EQUIP

**EMBED** 

BOT

ARCHITECTURAL

DIAMETER

Issued For Permit 10/28/2021 A DFS 09-24-2021 B DFS 10-28-2021 Sheet Title
STRUCTURAL INDEX SHEET

PI ANNING

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LICENSE NO: GE43704

DATE: 10-28-2021

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INTERIORS

THESE DRAWINGS SHALL NOT BE UTILIZED FOR CONSTRUCTION UNLESS EXPLICITLY NOTED AS "CONSTRUCTION ISSUE". THE INTENDED USE OF THESE DRAWINGS SHALL BE ONLY AS INDICATED IN THE ISSUANCE DESCRIPTION OF THE DRAWING TITLE BLOCK. MAINSTAY ENGINEERING GROUP, INC. SHALL ASSUME NO LIABILITY FOR DRAWINGS THAT ARE USED FOR ANY

VERTICAL SLOTTED

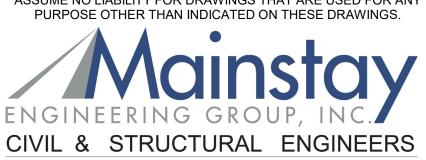
WELDED WIRE FABRIC

CONNECTION

WIND COLUMN

**WORK POINT** 

WOOD WIDE FLANGE



Mainstay Project No.: 21282

S-B70-001 1750 WALTON ROAD, BLUE BELL, PA 19422

DFS

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# STRUCTURAL NOTES SHEET

#### **EXISTING CONDITIONS**

1. THE EXISTING CONSTRUCTION SHOWN ON THESE DRAWINGS IS PROVIDED FOR REFERENCE ONLY. EXISTING CONSTRUCTION, DIMENSIONS, LOCATIONS, ELEVATIONS, ETC. SHALL BE VERIFIED IN THE FIELD PRIOR TO REMOVAL OR MODIFICATION OF ANY EXISTING STRUCTURAL MEMBER AND/OR SHOP DRAWING PREPARATION, ORDERING MATERIALS, FABRICATION, AND CONSTRUCTION OF NEW

2. SHOULD EXISTING CONDITIONS DIFFER FROM THAT SHOWN ON THE CONTRACT DOCUMENTS. NOTIFY THE DESIGN PROFESSIONAL PRIOR TO CONTINUATION OF WORK.

3. EXISTING STRUCTURAL MEMBERS SHALL NOT BE CUT OR MODIFIED UNLESS SPECIFICALLY SHOWN HEREIN OR UNLESS APPROVED IN WRITING BY THE DESIGN PROFESSIONAL.

4. THE CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT THE EXISTING STRUCTURE AND ADJACENT STRUCTURES FROM DAMAGE DURING EXCAVATION, DEMOLITION, AND CONSTRUCTION OF NEW WORK.

5. EXISTING STRUCTURAL DOCUMENTS ARE AVAILABLE FROM THE OWNER PER SCHEDULE BELOW VERIFY IN FIELD EXISTING CONDITIONS, STRUCTURAL MEMBER SIZES, AND LOCATIONS.

#### SAFETY AND COORDINATION

1. THE CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION SAFETY AND COORDINATION MEETING WITH THE SITE PROJECT MANAGER OR DESIGNATED REPRESENTATIVE.

2. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH THE SITE PROJECT MANAGER OR DESIGNATED REPRESENTATIVE, AND MISCELLANEOUS TRADES.

3. THE CONTRACTOR SHALL REFER TO SITE STANDARDS AND GUIDELINES FOR ADDITIONAL

4. THE CONTRACTOR SHALL PERFORM WORK IN STRICT ACCORDANCE WITH OSHA REGULATIONS AND SITE SAFETY GUIDELINES.

#### MEANS AND METHODS

1. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES FOR THE CONSTRUCTION OF THE PROJECT.

2. THE CONTRACTOR SHALL ENGAGE A PROFESSIONAL ENGINEER FOR MEANS AND METHODS OF CONSTRUCTION, INCLUDING BUT NOT LIMITED TO SCAFFOLDING, SHORING, UNDERPINNING, TEMPORARY BRACING, HOISTING, AND STORING OF MATERIALS OR EQUIPMENT ON THE EXISTING OR NEW STRUCTURE, ETC.

3. THE CONTRACTOR AND CONTRACTOR'S ENGINEER SHALL INSPECT, ASSESS, AND VERIFY THE EXISTING CONDITIONS AND EXTENT OF WORK PRIOR TO COMMENCING CONSTRUCTION OF NEW

4. THE CONTRACTORS ENGINEER SHALL REFER TO SITE STANDARDS AND GUIDELINES FOR ADDITIONAL REQUIREMENTS.

5. THE CONTRACTOR SHALL PROVIDE NECESSARY EQUIPMENT AND OTHER PERTINENT MATERIAL INCLUDING BUT NOT LIMITED TO LADDERS, LIFTS, AND OTHER CONSTRUCTION EQUIPMENT FOR THE COMPLETION OF THE WORK INDICATED ON THE CONTRACT DOCUMENTS.

6. THE CONTRACTOR SHALL REPAIR AND/OR REPLACE ANY DAMAGED STRUCTURAL MEMBER

7. CONSTRUCTION SHALL BE PERFORMED IN STRICT COMPLIANCE WITH FEDERAL, STATE, AND LOCAL RULES, REGULATIONS, CODES, AND LAWS.

8. THE CONTRACTOR SHALL PROVIDE SAFETY AND FALL PROTECTION IN ACCORDANCE WITH OSHA REGULATIONS AND SITE SAFETY GUIDELINES.

#### STRUCTURAL STEEL FRAMING

ANGLES AND PLATES

1. THE STRUCTURE HAS BEEN DESIGNED IN CONFORMANCE WITH THE ANSI/AISC 360 SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), DESIGN BASIS - LOAD AND RESISTANCE FACTOR DESIGN (LRFD).

2. STRUCTURAL STEEL SHALL COMPLY WITH THE FOLLOWING UNLESS OTHERWISE NOTED: WIDE FLANGE ASTM A992/A992M CHANNELS ASTM A36/A36M

3. BOLTS SHALL COMPLY WITH ASTM F3125, GRADE A325 OR A490. NUTS AND WASHERS SHALL BE COMPATIBLE WITH THE BOLT GRADE, HOLE SIZE, CONNECTION TYPE, AND INSTALLATION METHOD AS INDICATED IN "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS".

ASTM A36/A36M

4. CONNECTIONS SHALL BE BOLTED WITH 3/4 INCH DIAMETER A325-N (MINIMUM) HIGH STRENGTH BOLTS OR WELDED. MINIMUM CONNECTIONS SHALL BE DESIGNED TO SUPPORT A FACTORED LOAD NOT LESS THAN 10 KIPS IN ANY DIRECTION. PROVIDE A MINIMUM OF TWO (2) BOLTS PER CONNECTION SPACED AT 3 INCHES ON CENTER VERTICAL.

5. WELDING SHALL CONFORM TO THE AMERICAN WELDING SOCIETY (AWS) "STRUCTURAL WELDING CODE - STEEL". WELDING SHALL BE DONE BY QUALIFIED WELDERS CERTIFIED IN ACCORDANCE WITH AWS D1.1, "STRUCTURAL WELDING CODE - STANDARD QUALIFICATION PROCEDURE" AND AWS D1.3, "STRUCTURAL WELDING CODE - STRUCTURAL STEEL". WELDING ELECTRODES SHALL BE E70XX. FILLET WELDS SHALL BE NO LESS THAN 3/16 INCH AND SHALL

6. SEE "STRUCTURAL SUBMITTALS" SECTION FOR REQUIRED SUBMITTALS.

7. STRUCTURAL STEEL FABRICATION SHALL BE PERFORMED BY AN ORGANIZATION EXPERIENCED IN STRUCTURAL FABRICATION OF EQUIVALENT MAGNITUDE TO THIS PROJECT, AND HAS AN AISC CERTIFICATION FOR STRUCTURAL STEELWORK. PROVIDE, WITH THE BID, A COPY OF THE AISC CERTIFICATE INDICATING THAT THE FABRICATION PLANT MEETS AISC CATEGORY STD CERTIFICATION. IN LIEU OF AN AISC CERTIFICATION, THE FABRICATOR MAY SUBMIT DOCUMENTATION OF EQUIVALENT EXPERIENCE IN THE FABRICATION OF THE ITEM OR ITEMS IN QUESTION, FOR REVIEW AND APPROVAL BY THE OWNER'S ENGINEER OF RECORD.

8. STRUCTURAL STEEL NOT EXPOSED TO WEATHER SHALL BE PREPPED BY POWER TOOL CLEANING (SSPC-SP3) THEN SHOP COATED WITH RUST INHIBITIVE PAINT. DO NOT COAT STEEL TO RECEIVE SPRAYED-ON FIREPROOFING OR CONCRETE ENCASEMENT.

9. SPLICING OF STRUCTURAL STEEL SECTIONS, NOT INDICATED ON CONTRACT DOCUMENTS, IS PROHIBITED WITHOUT PRIOR WRITTEN APPROVAL BY THE STRUCTURAL ENGINEER OF RECORD.

10. ORIENT MILL CAMBER UPWARD DURING FABRICATION AND ERECTION.

11. ALUMINUM AND STEEL MEMBERS SHALL BE TREATED OR PROPERLY SEPARATED TO PREVENT GALVANIC AND CORROSIVE EFFECTS.

12. STEEL FABRICATOR IS SOLELY RESPONSIBLE FOR SURVEYING AND VERIFICATION OF EXISTING CONDITIONS INCLUDING BUT NOT LIMITED TO THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING WALLS AND FRAMING.

#### **TESTING AND INSPECTIONS**

1. THE OWNER OR OWNER'S REPRESENTATIVE SHALL ENGAGE A QUALIFIED INDEPENDENT TESTING AND INSPECTION AGENCY TO SAMPLE MATERIALS, PERFORM TESTS, INSPECT WORK, AND SUBMIT REPORTS TO ASCERTAIN CONFORMANCE WITH THE CONTRACT DOCUMENTS AND DESIGN PROFESSIONAL REVIEWED SUBMITTALS.

2. THE INDEPENDENT TESTING AND INSPECTION AGENCY SHALL PREPARE AND SUBMIT REPORTS OF INSPECTIONS AND TESTING WHICH INCLUDE, BUT ARE NOT LIMITED TO, PROJECT IDENTIFICATION NAME, PROJECT NUMBER, DATE OF REPORT, DATE OF INSPECTION OR TEST, NAME OF AGENCY, NAME OF PERSONNEL WHO PERFORMED THE TEST OR INSPECTION. SPECIFIC LOCATION OF TEST OR INSPECTION, STATEMENT OF COMPLIANCE OR NONCOMPLIANCE DEFICIENCY, AND ANY OTHER PERTINENT INFORMATION. "NONCOMPLIANCE" REPORTS SHALL BE RECTIFIED AND SUPERSEDED BY A

3. THE INDEPENDENT TESTING AND INSPECTION AGENCY/CONSTRUCTION MANAGER/GENERAL CONTRACTOR SHALL MAINTAIN A NONCOMPLIANT DEFICIENCIES LOG FOR INSPECTION AND TESTING RESULTS THAT REQUIRE REMEDIATION AND RE-INSPECTION. NOTIFY THE ENGINEER OF RECORD DAILY OF NONCOMPLIANCE DEFICIENCIES LOGGED.

4. CONTRACTORS SHALL COOPERATE AND FACILITATE THE WORK OF THE INDEPENDENT INSPECTION AND TESTING AGENCY.

#### STRUCTURAL STEEL FRAMING

THE INDEPENDENT TESTING AND INSPECTION AGENCY SHALL PERFORM INSPECTIONS AND TESTING OF STRUCTURAL STEEL PER THE FOLLOWING MINIMUM REQUIREMENTS:

1. STRUCTURAL STEEL BOLTED CONNECTIONS SHALL BE VISUALLY INSPECTED IN ACCORDANCE WITH RSCC'S "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 AND A490 BOLTS".

2. STRUCTURAL STEEL FIELD WELDED CONNECTIONS SHALL BE VISUALLY INSPECTED IN ACCORDANCE WITH AWS D1.1. FIELD WELDS THAT FAIL VISUAL INSPECTION SHALL BE TESTED WITH A NON-DESTRUCTIVE METHOD IN ACCORDANCE WITH AWS D1.1

#### STRUCTURAL SUBMITTALS

1. PREPARE AND SUBMIT A SCHEDULE OF STRUCTURAL SUBMITTALS. SUBMITTALS SHALL BE LISTED IN CHRONOLOGICAL ORDER BY DATES REQUIRED FOR CONSTRUCTION. ESTABLISH REVIEW DATES BASED ON TIME REQUIRED FOR REVIEW, ORDERING, FABRICATION, AND DELIVERY OF MATERIALS. SCHEDULE SHALL INCLUDE ADDITIONAL TIME FOR ADDITIONAL REVIEWS OF SUBMITTALS WHEN CORRECTIONS OR REVISIONS ARE NEEDED. SUBMITTAL REVIEW PERIODS MAY NOT OVERLAP BY MORE THAN ONE WEEK. ENGINEER IS NOT RESPONSIBLE FOR DELAYS RESULTING FROM SUBMISSION OF OVERLAPPING SUBMITTAL PACKAGES.

2. PREPARE SUBMITTALS INTO PDF PACKAGES. INCORPORATING COMPLETE INFORMATION INTO EACH PDF FILE. SUBMITTAL FILE NAMES SHALL BE A REASONABLE LENGTH. RED-LINED REVIEW PDF FILES WILL BE RETURNED.

3. USE OF THE CONTRACT DOCUMENTS AS SHOP DRAWINGS IS PROHIBITED. THE FABRICATOR/DETAILER/SUPPLIER SHALL PREPARE THEIR OWN SHOP DRAWINGS.

4. ALLOW A MINIMUM OF 10 BUSINESS DAYS FOR REVIEW OF EACH SUBMITTAL & RE-SUBMITTAL. ALLOW ADDITIONAL TIME, 15 BUSINESS DAYS MINIMUM, WHERE A SEQUENTIAL REVIEW IS REQUIRED BY TWO OR MORE DESIGN PROFESSIONALS.

5. THE CONTRACTOR SHALL COORDINATE SUBMITTALS THAT REQUIRE SEQUENTIAL REVIEW. ENGINEER RESERVES THE RIGHT TO WITHHOLD ACTION ON A SUBMITTAL REQUIRING COORDINATION WITH OTHER SUBMITTALS UNTIL RELATED SUBMITTALS ARE RECEIVED

6. SHOP DRAWING SUBMITTALS SHALL BE PROPORTIONED INTO REASONABLY SIZED PACKAGES, CONTAINING NOT MORE THAN 100 SHEETS PER SUBMITTAL, UNLESS APPROVED BY ENGINEER PRIOR

7. SEE MATERIAL SPECIFICATIONS FOR POSSIBLE ADDITIONAL SUBMITTAL REQUIREMENTS.

8. SUBSTITUTION REQUESTS MAY BE CONSIDERED BY THE OWNER/OWNER REPRESENTATIVE AND THE ENGINEERING DESIGN PROFESSIONAL IF SUBMITTED A MINIMUM OF 21 CALENDAR DAYS PRIOR TO THE REQUIRED PURCHASE DATE AND/OR INSTALLATION DATE. THE SUBSTITUTION SUBMISSION SHALL PROVIDE THE FOLLOWING MINIMUM INFORMATION FOR REVIEW BY THE OWNER/OWNER

REPRESENTATIVE AND THE ENGINEERING DESIGN PROFESSIONAL CONTRACTOR STATEMENT INDICATING WHY SUBSTITUTION IS BEING REQUESTED. CONTRACTOR DETAILED COMPARISON OF THE SUBSTITUTION AND CONTRACT DOCUMENT REQUIREMENTS FOR COMPATIBILITY INCLUDING COST SAVINGS TO THE OWNER AND CONSTRUCTION/DELIVERY TIME REDUCTION TO THE PROJECT SCHEDULE. CONTRACTOR TO INDICATE THAT THE SUBSTITUTION HAS BEEN COORDINATED WITH OTHER

CONTRACTOR WORK, IF APPLICABLE. CONTRACTOR TO PROVIDE SIMILAR SUBMITTAL SUBMISSION AS REQUIRED BY THE CONTRACT

OWNER/OWNER REPRESENTATIVE REVIEW AND ACCEPTANCE OF THE PROPOSED SUBSTITUTION BASED ON COST AND OR TIME SAVINGS. SUBSTITUTION SUBMISSION REVIEW TIME FRAME SHALL BE AS PER THE CONTRACT DOCUMENT

SUBMITTAL REVIEW TIME FRAME. SUBMISSION OF SUBSTITUTIONS AS RFI'S WILL BE NOT BE REVIEWED.

#### STRUCTURAL STEEL

1. SUBMIT STEEL SHOP DRAWINGS PREPARED IN STRICT ACCORDANCE WITH AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES. SHOP DRAWINGS MUST BE SUBMITTED AND REVIEWED PRIOR TO START OF FABRICATION.

2. STRUCTURAL STEEL SHOP DRAWINGS SHALL BE PREPARED UNDER THE DIRECTION OF A PROFESSIONAL ENGINEER, REGISTERED IN THE STATE WHERE THE PROJECT IS LOCATED. THE ENGINEER EMPLOYED BY THE FABRICATOR SHALL PREPARE A SIGNED AND SEALED LETTER OF CERTIFICATION STATING THAT THE STRUCTURAL STEEL SHOP DRAWINGS, INCLUDING CONNECTIONS. HAVE BEEN PREPARED UNDER THEIR DIRECTION. THE CERTIFICATION LETTER SHALL BE SUBMITTED TO THE OWNER'S ENGINEER OF RECORD (EOR) PRIOR TO THE SUBMITTAL OF THE STRUCTURAL STEEL SHOP DRAWINGS. SHOP DRAWINGS WILL NOT BE REVIEWED BY EOR WITHOUT THE RECEIPT AND ACCEPTANCE OF THE CERTIFICATION LETTER.



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STATE OF NEW JERSEY PROFESSIONAL ENGINEER LICENSE NO: GE43704

DATE: 10-28-2021

A DFS 09-24-2021 B DFS 10-28-2021

Sheet Title
STRUCTURAL NOTES SHEET

DFS S-B70-002

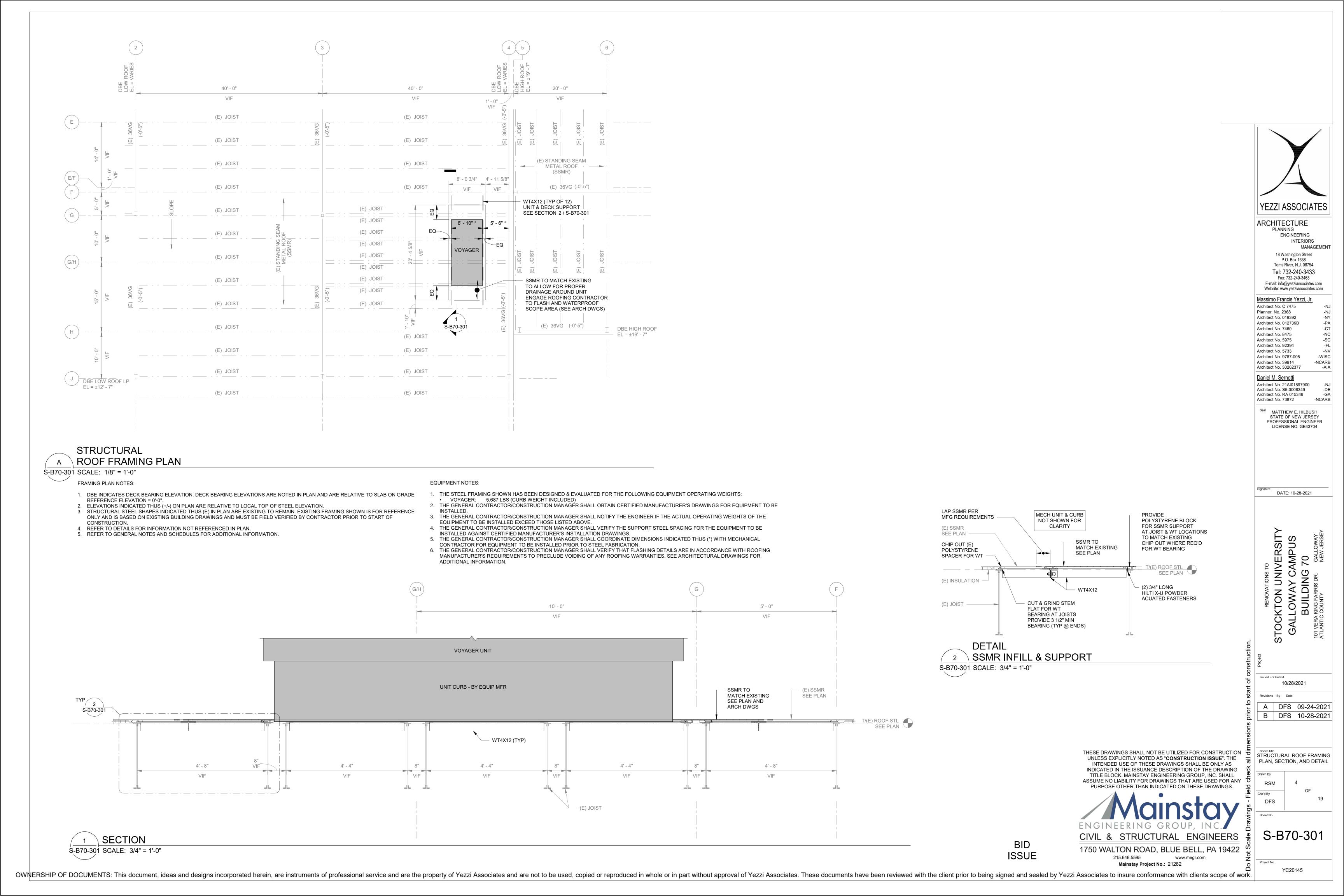
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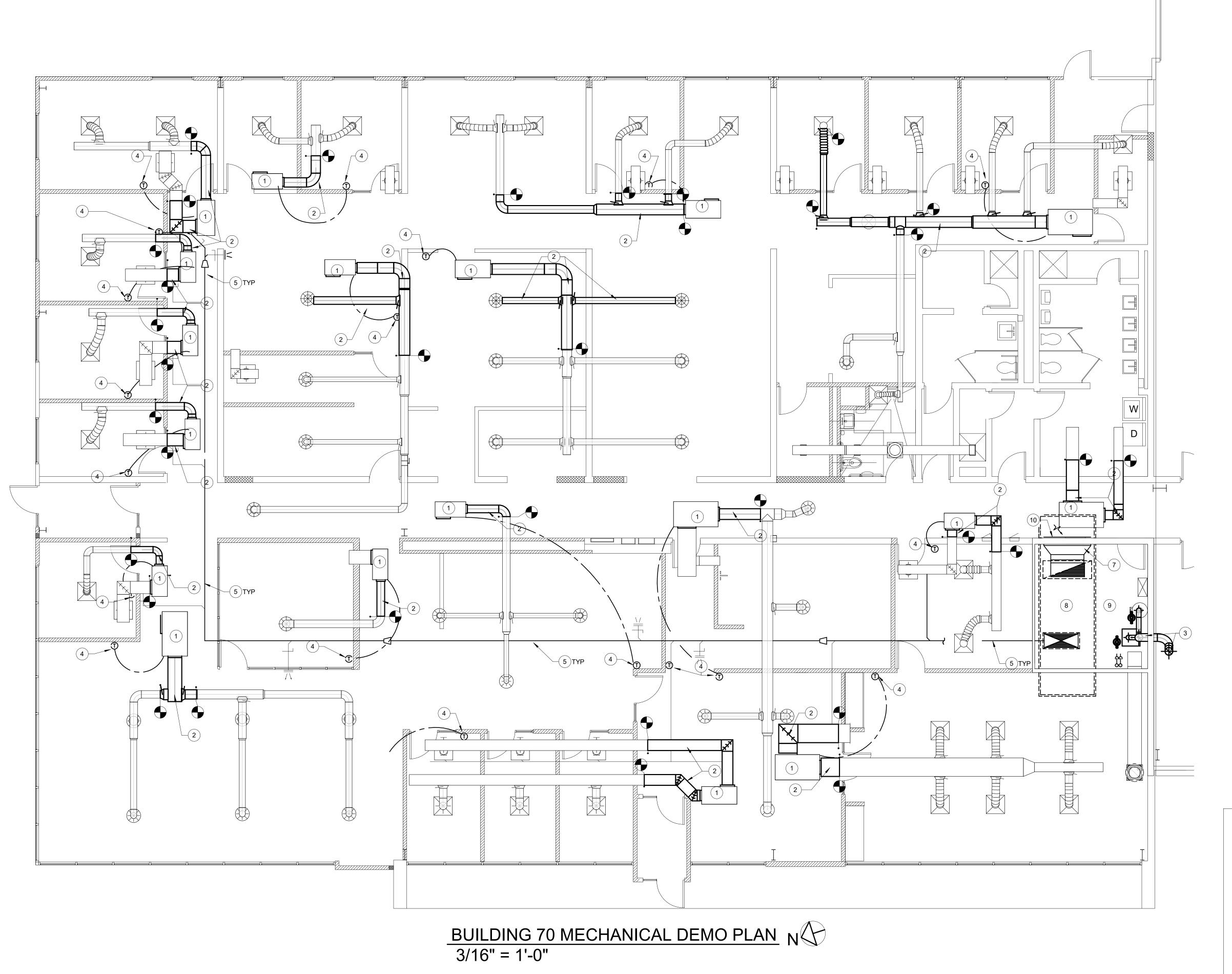
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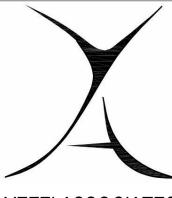
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# NOTES: (THIS SHEET ONLY)

- 1. DEMO EXISTING WATER SOUCRE HEAT PUMP. DISCONNECT FROM DUCTWORK AS
- 2 . DEMO EXISTING LOW PRESSURE DUCT WORK FROM WATER SOUCRE HEAT PUMP AS
- 3 . DEMO EXISTING GAS VENT PIPING AT BOILER AND WATER HEATER. DEMO ALL GAS VENT PIPING INCLUDING PENETRATION THROUGH ROOF. CONTRACTOR SHALL PATCH THE WALL PENETRATION TO PREVENT WATER INTRUSION INTO THE BUILDING. CONTRACTOR SHALL CAP/SEAL GAS PIPING.
- 4 . DEMO EXISTING THERMOSTAT AND THERMOSTAT WIRING. REUSE CONDUIT AND JUNCTION BOX. CONTRACTOR SHALL PATCH AND PAINT ALL OPENINGS NOT USED FOR NEW WORK.
- 5. DEMO ALL EXISTING DUCTWORK FROM EXISTING ROOFTOP UNIT.
- 7 . DEMO EXISTING RETURN DUCT AND GRILLE FROM EXISTING RTU. WALL PENETRATION SHALL REMAIN FOR FUTURE USE.
- 8 . DEMO EXISTING RTU AND ROOF CURB. SEE STRUCTURAL FOR DIRECTION TO INFILL ROOF DECK IN PREPARATION FOR NEW ROOF CURB.
- 9 . DEMO EXISTING HARD CEILING AS REQUIRED IN MECHANICAL ROOM. SEE SHEET M-B70-202 NEW WORK PLAN FOR PATCHING OF HARD CEILING.
- 10 . CONTRACTOR SHALL DEMO TRANSFER GRILLE, PATCH WALL PENETRATION, AND PAINT TO MATCH.

# GENERAL NOTES: (This Sheet Only)

- ALL EXISTING DIFFUSERS SHALL REMAIN FOR REUSE
- CONTRACTOR SHALL SEE PHASING PLAN FOR INSTRUCTIONS ON WORK PHASING.



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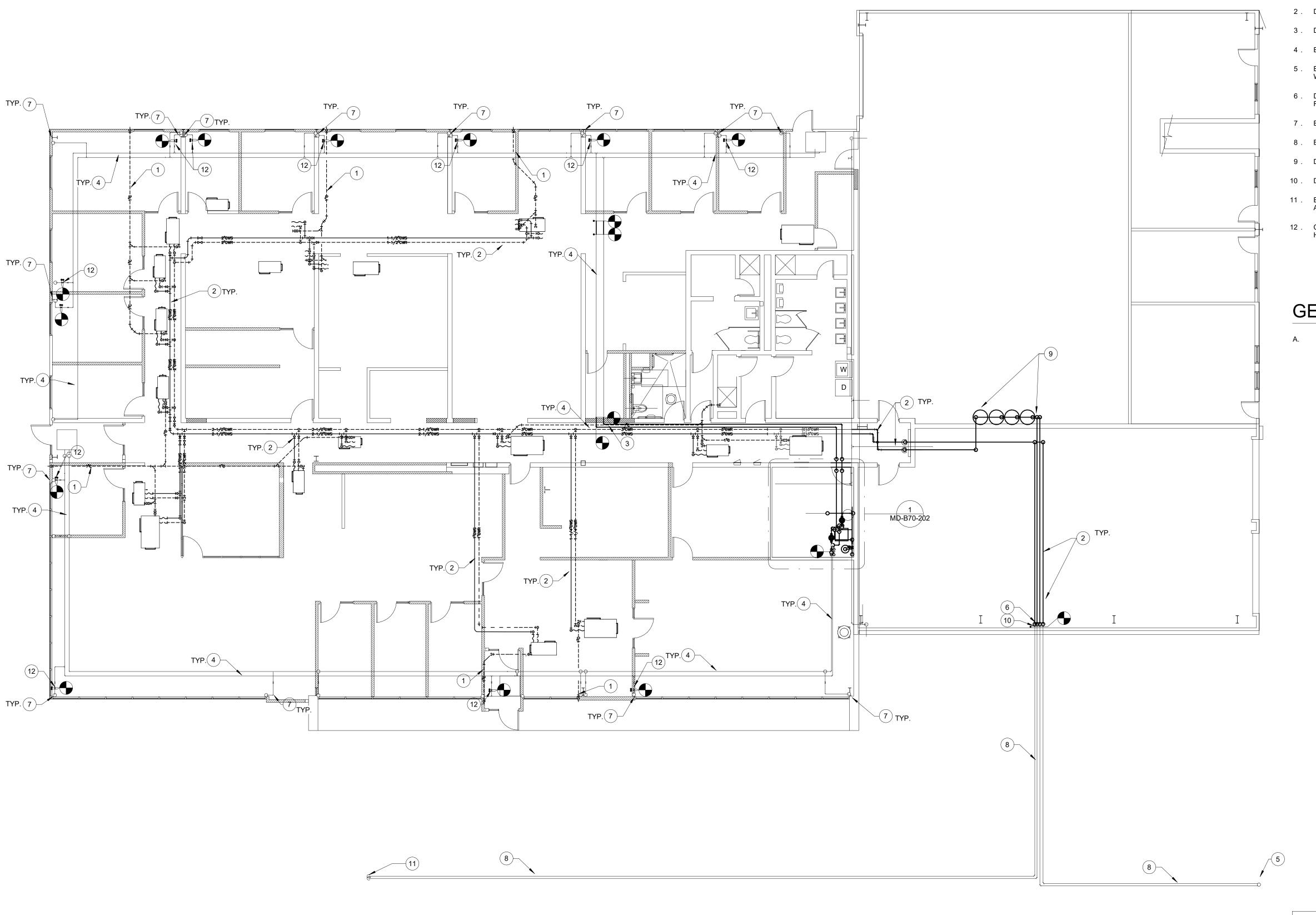
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Sheet Title
BLDG. 70 MECHANICAL DEMO
PLAN

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BUILDING 70 PIPING DEMO PLAN N

### NOTES: (THIS SHEET ONLY)

- 1. DEMO ALL EXITING CONDENSATE PIPING. CONTRACTOR SHALL PATCH AND PAINT TO MATCH ANY OPENINGS IN BUILDING EXTERIOR LEFT FROM DEMOED PIPING.
- 2 . DEMO ALL EXISTING GEOTHERMAL/CWS/CWR PIPING INSIDE THE BUILDING.
- 3 . DEMO EXISTING HW PIPING.
- 4 . EXISTING HW PIPING SHALL REMAIN.
- 5 . EXISTING GEOTHERMAL WELL SHALL BE ABANDONED AND PLUGGED IN ACCORDANCE WITH STATE OF NEW JERSEY REGULATIONS.
- 6. DEMO EXISTING GEOTHERMAL RISER PIPING. CONTRACTOR SHALL CUT OFF PIPING FLUSH WITH FLOOR AND FILL WITH CONCRETE AND PATCH TO MATCH EXISTING.
- 7. EXISTING HW BASEBOARD HEATERS SHALL REMAIN.
- 8. BELOW GRADE GEOTHERMAL PIPING SHALL REMAIN AND BE ABANDONED IN PLACE.
- 9 . DEMO ALL GEOTHERMAL TANKS, PIPING, AND EQUIPMENT IN THIS AREA.
- 10 . DEMO EXISTNG CHASE AROUND GEOTHERMAL RISER PIPING.
- 11 . EXISTING GEOTHERMAL WELL SHALL BE CONVERTED INTO A MONITORING WELL IN ACCORDANCE WITH STATE OF NEW JERSEY REGULATIONS.
- 12 . CONTRACTOR SHALL DEMO SECTION OF PIPING IN RETURN PIPE TO EACH BASEBOARD HEATER FOR INSTALLATION OF NEW CIRCUIT SETTER BALANCING VALVE.

# GENERAL NOTES: (This Sheet Only)

A. CONTRACTOR SHALL SEE PHASING PLAN FOR INSTRUCTIONS ON WORK PHASING.



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GALLOWAY CAMPUS
BUILDING 70
TO VERA KING FARRIS DR. GALLOWA

Issued For Bid 10/28/202

10/28/2021 Revisions By Date

Revisions By Date

Sheet Title
BLDG. 70 PIPING DEMO PLAN

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Chk'd By
CWH

meet No.

MD-B70-201

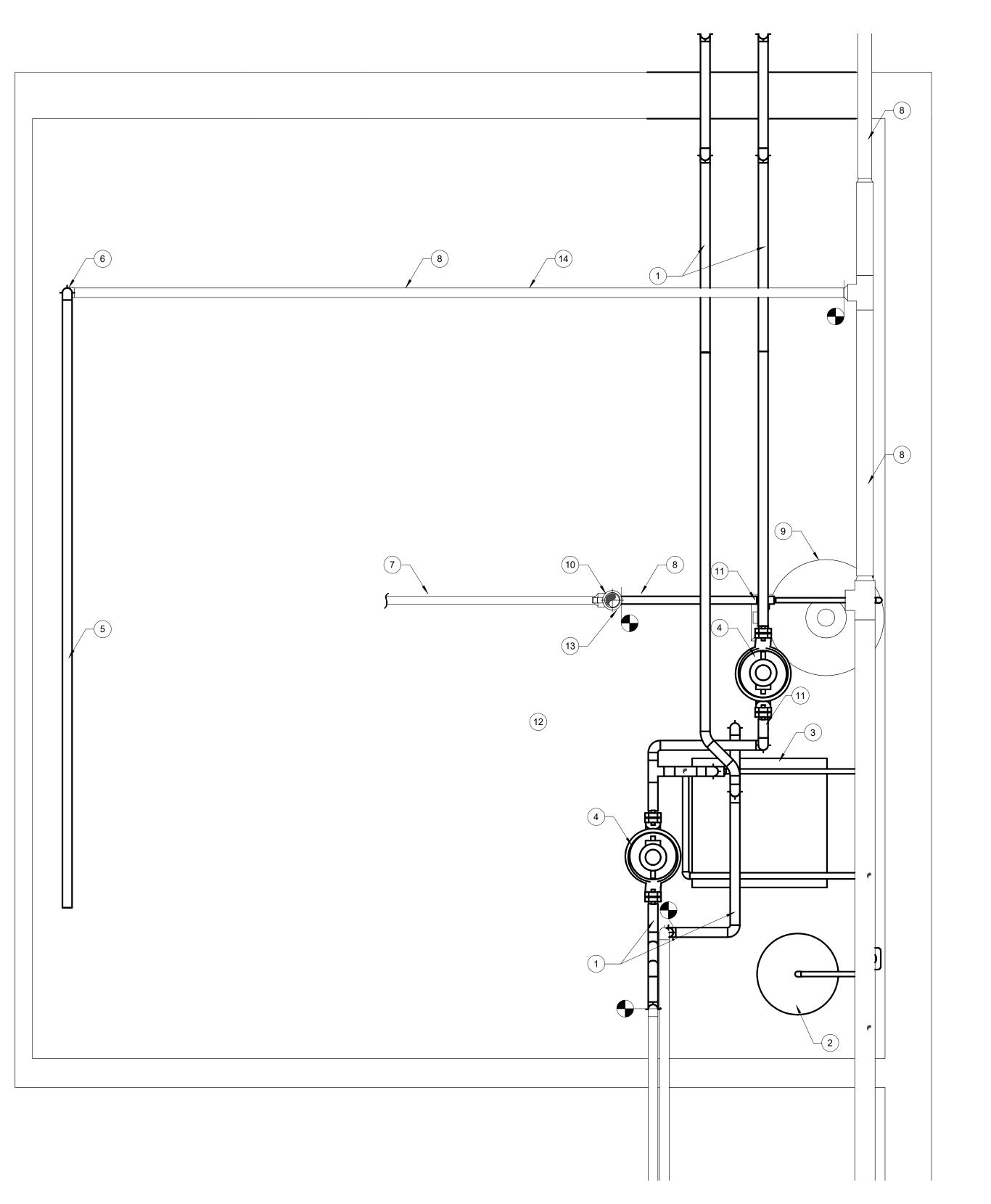
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BUILDING 70 PIPING DEMO PLAN - MECH ROOM 1" = 1'-0"

# NOTES: (THIS SHEET ONLY)

- 1. DEMO ALL EXISTING HOT WATER PIPING IN MECHANICAL/ELECTRICAL ROOM.
- 2. DEMO EXISTING EXPANSION TANK AND ASSOCIATED PIPING AND CAP AT CONNECTION TO
- 3. DEMO EXISTING BOILER AND ASSOCIATED HOT WATER AND GAS PIPING. CAP GAS PIPE BRANCH TO BOILER SO THAT EXISITNG WATER HEATER REMAINS ACTIVE.
- 4. DEMO EXISTING HOT WATER PUMPS.
- 5. DEMO EXISTING NATURAL GAS PIPING ON ROOF TO RTU. CAP AND SEAL PIPING ON ROOF TO ALLOW EXISTING NATURAL GAS APPLIANCES TO REMAIN IN OPERATION DURING
- 6. NATURAL GAS PENETRATION THROUGH ROOF.
- 7. EXISTING NATURAL GAS PIPING TO EMERGENCY GENERATOR SHALL REMAIN.
- 8. EXISTING NATURAL GAS PIPING ABOVE HARD CEILING SHALL REMAIN.
- 9. EXISTING WATER HEATER AND ALL ASSOCIATED WATER PIPING SHALL REMAIN.
- 10 . NATURAL GAS PIPING DROP THROUGH HARD CEILING.
- 11. EXISTING NATURAL GAS PIPING TO BOILER IS ROUTED BENEATH THE PUMP IN THIS AREA, AND IS TO BE DEMOED BACK TO THE BRANCH PIPING TO WATER HEATER. CONTRACTOR SHALL CAP THE BRANCH TO THE EXISTING WATER HEATER TO ALLOW THE WATER HEATER TO REMAIN OPERATIONAL DURING CONSTRUCTION.
- 12 . EXISTING EMERGENCY GENERATOR IN THIS AREA SHALL REMAIN, AND SHALL BE AVAILABLE FOR OPERATION DURING CONSTRUCTION SHOULD THERE BE A POWER
- 13 . DEMO GAS PIPING FROM 2" CONNECTION TO DOMESTIC WATER HEATER AND BOILER. 2" GAS PIPING SHALL REMAIN FOR REUSE.
- 14 . CONTRACTOR SHALL VERIFY THAT EXISTING GAS PIPE IS AT LEAST 1.25". IF NOT CONTRACTOR SHALL DEMO PIPE TO THE BRANCH LINE AND REPLACE WITH NEW 1.25" PIPE BACK TO ITS CONNECTION TO THE MAIN.

# GENERAL NOTES: (This Sheet Only)

CONTRACTOR SHALL SEE PHASING PLAN FOR INSTRUCTIONS ON WORK PHASING.



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Architect No. 30262377 Daniel M. Sernotti Architect No. 21AI01897900 Architect No. S5-0008349

Architect No. RA 015346 Architect No. 73872



Sheet Title
BLDG.70 PIPING DEMO PLAN
(MECH ROOM)

CWH

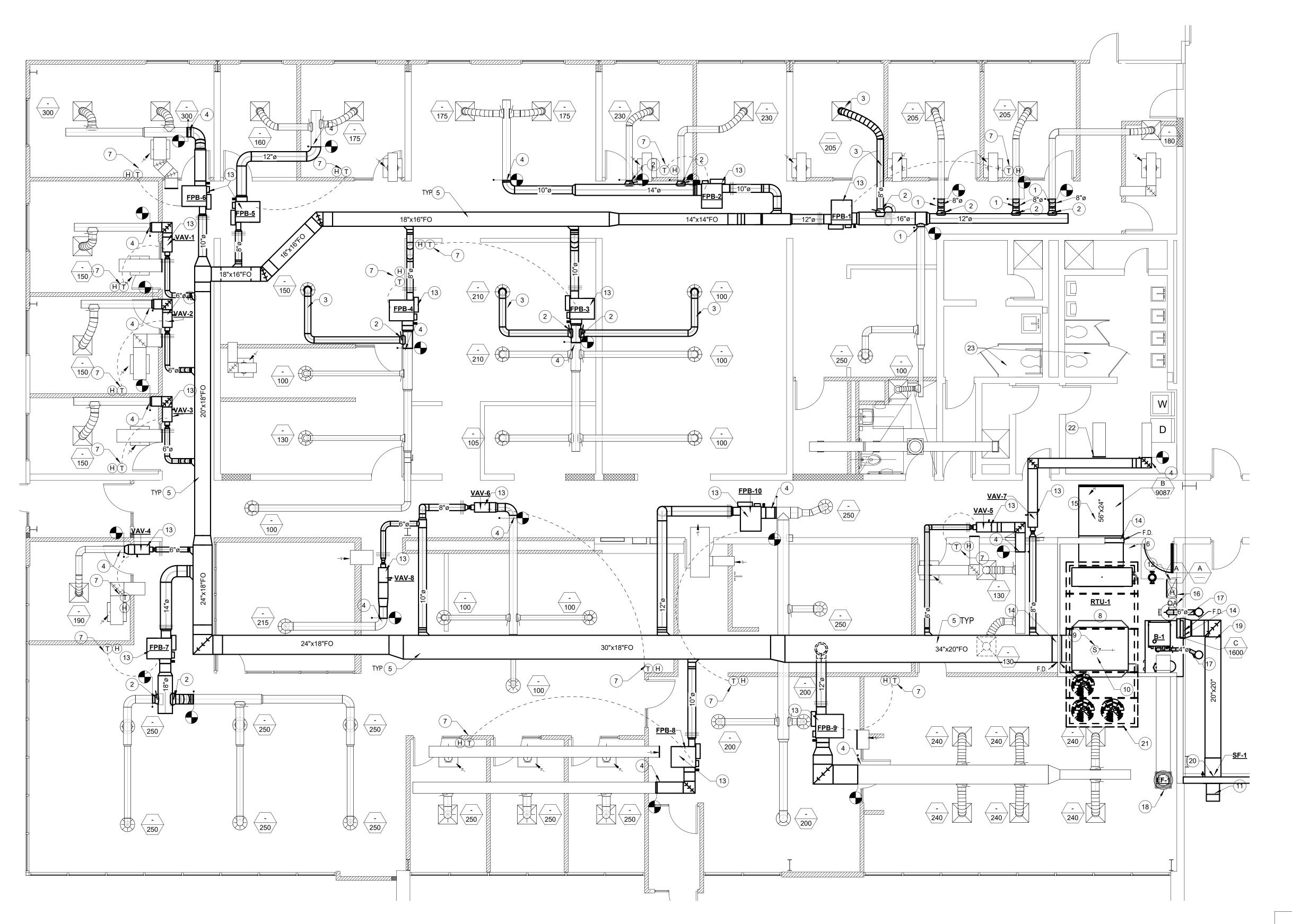
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BUILDING 70 MECHANICAL NEW WORK PLAN N 3/16" = 1'-0"

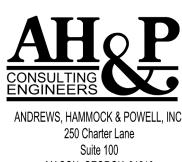
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# GENERAL NOTES: (This Sheet Only)

- CONTRACTOR SHALL INSTALL NEW DAMPERS AT THE TAKEOFF FOR ANY DIFFUSER THAT DOES NOT HAVE A FULLY OPERATIONAL BALANCING DAMPER.
- CONTRACTOR SHALL INSTALL NEW INSULATION TO, AND ON BACKSIDE OF ALL

NOTES: (THIS SHEET ONLY)

- 1. CONNECT EXISTING BRANCH DUCT TO NEW MAIN LOW PRESSURE DUCT
- 2. PROVIDE NEW BALANCING DAMPER AS REQUIRED.
- 3. INSTALL NEW ROUND LOW PRESSURE DUCT AND CONNECT TO EXISTING
- 4. CONNECT EXISTING LOW PRESSURE DUCT TO NEW LOW PRESSURE DUCT. TRANSITION DUCT AS REQUIRED
- 5. ROUTE NEW MEDIUM PRESSURE DUCT FROM RTU TO TERMINAL UNITS. ROUTE NEW DUCT IN SAME GENERAL LOCATION AS EXISTING DUCT. FOR AREAS WHERE SPIRAL DUCT WAS NOT INSTALLED THE NEW MEDIUM PRESSSURE DUCT SHALL AVOID ALL EXISTING DUCTS.
- 6. CONNECT NEW RETURN DUCT DROP TO NEW RTU RETURN DUCT CONNECTION. TRANSITION AS REQUIRED IN THE VERTICAL.
- 7. NEW WALL MOUNTED THERMOSTAT/HUMIDISTAT TO CONTROL TERMINAL UNIT. CONTRACTOR SHALL PULL NEW WIRING IN PLACE OF OLD THERMOSTAT WIRING. IF NEW WIRING CANNOT BE PULLED THROUGH EXISTING CONDUIT, CONTRACTOR SHALL UTILIZE WIRE MOULDING TO CONCEAL THERMOSTAT
- 8. INSTALL NEW RTU-1 ATOP NEW VIBRATION ISOLATION ROOF CURB.
- 9. NEW DUCT MOUNTED SMOKE DETECTOR TO SHUTDOWN RTU UPON ACTIVATION, AND NOTIFY FIRE ALARM SYSTEM.
- 10. TRANSITION SUPPLY DUCT IN VERTICAL TO CONNECT TO NEW RTU.
- 11 . NEW 90° WEATHER HOOD FOR MECHANICAL ROOM SUPPLY FAN. SEE SUPPLY
- 12 . INTALL TWO 22" X 20" EGG CRATE GRILLES IN EXISTING VERTICAL COMBUSTION AIR DUCT. CONTRACTOR SHALL MODIFYU EXISTING OPENINGS IN DUCT AS REQUIRED. THE NEW GRILLES SHALL REPLACE EXISTING GRILLES.
- 13 . INSTALL NEW TERMINAL UNIT AS REQUIRED. ENSURE MINIMUM STRAIGHT RUN OF MEDIUM PRESSURE INLET DUCT IS PROVIDED PER MANUFACTURES
- 14. INSTALL NEW FIRE DAMPER. SEE FIRE DAMPER DETAIL FOR ADDITIONAL
- 15 . NEW 62" x 48" RETURN GRILLE SHALL BE INSTALLED IN THE CORRIDOR OUTSIDE OF THE MECHANICAL ROOM. RETURN GRILLE SHALL BE TAPPED INTO THE BOTTOM OF THE NEW RETURN DUCT. ADD DUCT LINER FOR ENTIRE RETURN DUCT OUTSIDE OF THE MECHANICAL ROOM.
- 16 . INSTALL NEW OUTSIDE AIR TEMPERATURE SENSOR AND HUMIDITY SENSOR TO THE INSIDE OF THE PARAPET WALL ON THE ROOF NEAR THE NEW RTU.
- 17. ROUTE FLUE DUCTWORK AS HIGH AS POSSIBLE AND PENETRATE MECHANICAL ROOM WALL INTO SHOP AREA. CONTRACTOR SHALL BUILD FIRE RATED CHASE IN AUTOMOTIVE SHOP TO MAINTAIN THE FIRE RATING OF THE MECHANICAL ROOM WALL. SEE ARCHITECTURAL. EXTEND FLUE UP THROUGH ROOF. CONDENSING BOILER FLUE SHALL BE STAINLESS STEEL AL29-4C. THE DOMESTIC WATER HEATER FLUE SHALL BE TYPE B GAS VENT. CONTRACTOR SHALL FIRESTOP PENETRATIONS TO MAINTAIN THE FIRE RATING OF THE WALL.
- 18. EXISTING EXHAUST FAN ON ROOF. TAB CONTRACTOR SHALL TEST ADJUST AND BALANCE EXISTING EXHAUST FAN. AIRFLOW SHALL BE SET TO 1500 CFM.
- 19. NEW MECHANICAL ROOM SUPPLY AIR DUCT. ROUTE DUCT THROUGH THE MECHANICAL ROOM WALL AND THEN ROUTE AS HIGH AS POSSIBLE IN
- 20 . NEW SUPPLY AIR FAN. THE FAN AND HOUSING SHALL BE MOUNTED INSIDE OF THE BUILDING SO THAT THE END OF THE HOUSING IS FLUSH WITH THE EXTERIOR WALL, MOTOR SHOULD BE ACCESSIBLE FROM THE OUTSIDE OF THE BUILDING.SEE SUPPLY FAN DETAIL.
- CONTRACTOR SHALL INSTALL NEW VIBRATION ISOLATION ROOF CURB. CURB SHALL BE MINIMUM 26" HIGH ABOVE ADJACENT ROOF SURFACE..
- 22 . CAP EXISITING RETURN DUCT SO NO AIR FROM THE RESTROOMS CAN FLOW BACK INTO THE RETURN AIR PLENUM. SEE NOTE 23 FOR EXHAUST FAN RE-BALANCING AND RESTROOM PRESSURIZATION.
- CONTRACTOR SHALL RE-BALANCE THE EXISITNG EXHAUST FAN FOR THE BATHROOMS TO ENSURE THE BATHROOMS ARE NEGATIVELY PRESSURIZED CLOSED AND VAV-7 AT FULL COOLING AIRFLOW. IF THE EXHAUST FAN CANNOT ACHIEVE THE NEGATIVE PRESSURE. A FORMAL RFI SHALL BE SUBMITTED BY



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-NCARB

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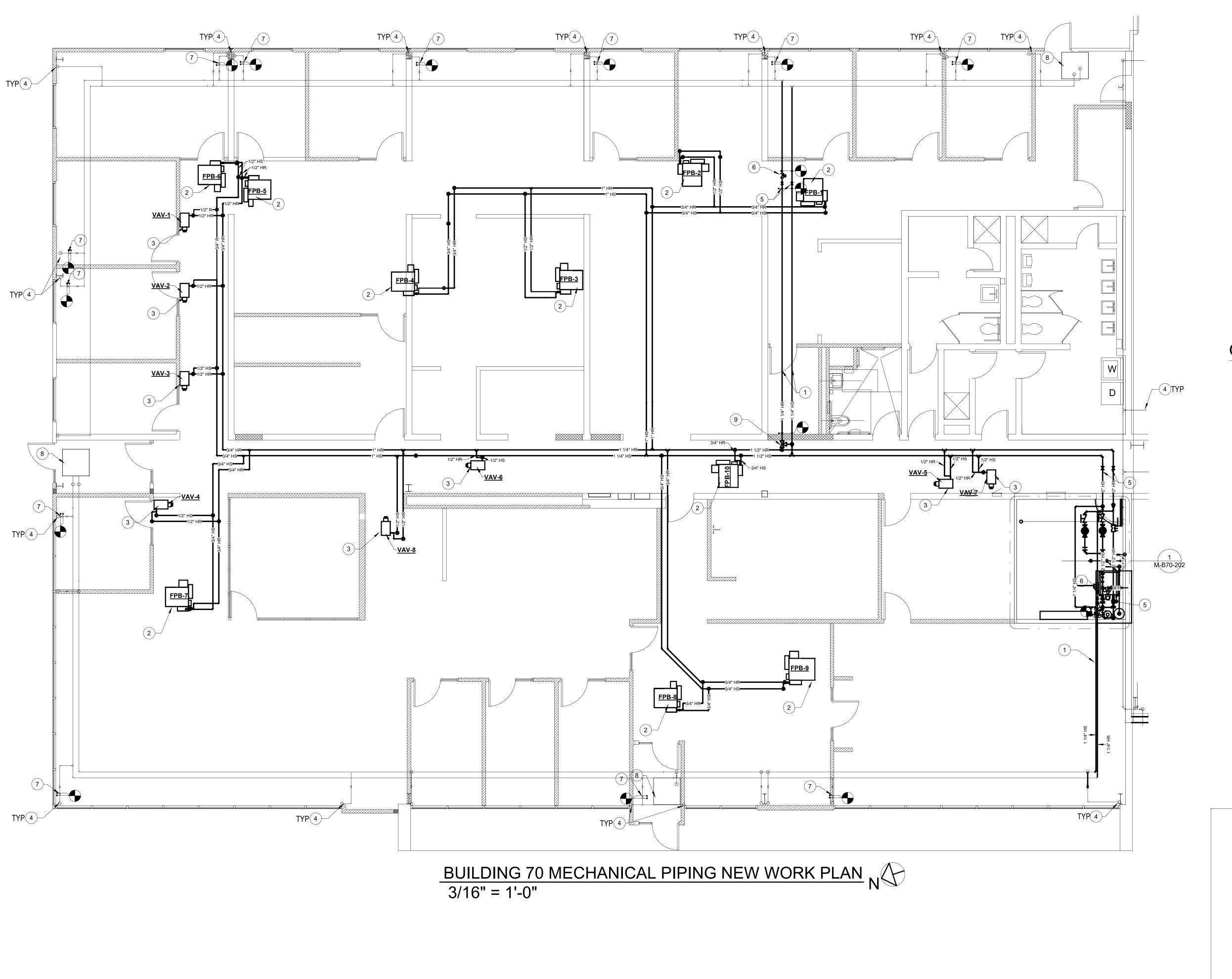
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BLDG. 70 MECHANICAL NEW **WORK PLAN** 

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- CONTRACTOR SHALL BALANCE ALL EXISTING SUPPLY DIFFUSERS/GRILLES FOR NEW
- CONTRACTOR SHALL SEE PHASING PLAN FOR INSTRUCTIONS ON WORK PHASING.



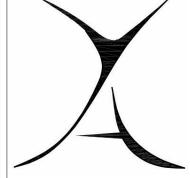
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# NOTES: (THIS SHEET ONLY)

- 1. EXISTING HOTWATER SUPPLY AND RETURN PIPING TO EXISTING BASEBOARD HEATERS.
- 2 . PROVIDE PIPING COMPONENTS IN ACCORDANCE WITH HOT WATER FAN POWERED BOX DETAIL AND WITH THE SPECIFICATIONS. WHERE SUPPLY AND RETURN PIPING CONNECT TO EACH TERMINAL.
- 3 . PROVIDE PIPING COMPONENTS IN ACCORDANCE WITH HOT WATER VAV BOX DETAIL AND WITH THE SPECIFICATIONS. WHERE SUPPLY AND RETURN PIPING CONNECT TO EACH TERMINAL.
- 4. EXISTING PIPING TO AND FROM THE BASEBOARD HEATERS.
- 5 . PROVIDE MANUAL SHUTOFF VALVES TO ISOLATE VAV/FPB SECTIONS OF PIPING FOR MAINTENANCE.
- 6 . INSTALL NEW CIRCUIT SETTER. SET TO 16 GPM
- INSTALL NEW CIRCUIT SETTER. TESTING, ADJUSTING, AND BALANCING CONTRACTOR SHALL SET CIRCUIT SETTER SO THAT THE WATER TEMPERATURE LEAVING THE BASEBOARD HEATERS ARE ALL EQUAL. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- 8 . EXISTING CEILING UNIT HEATER SHALL REMAIN.
- 9. THREE WAY CONTROL VALVE TO CONTROL EAST ZONE BASEBOARD HEATING.

# GENERAL NOTES: (This Sheet Only)

- ROUTE PIPE AS HIGH AS POSSIBLE TO UNDERSIDE OF BEAM OR STRUCTURE TO ALLOW ROOM FOR PIPE TO DROP OUT OF BOTTOM AND ELBOW TO LOWER PLANE. COORDINATE WITH DUCT LOCATION AS SHOWN.
- CONTRACTOR SHALL SEE PHASING PLAN FOR INSTRUCTIONS ON WORK PHASING.



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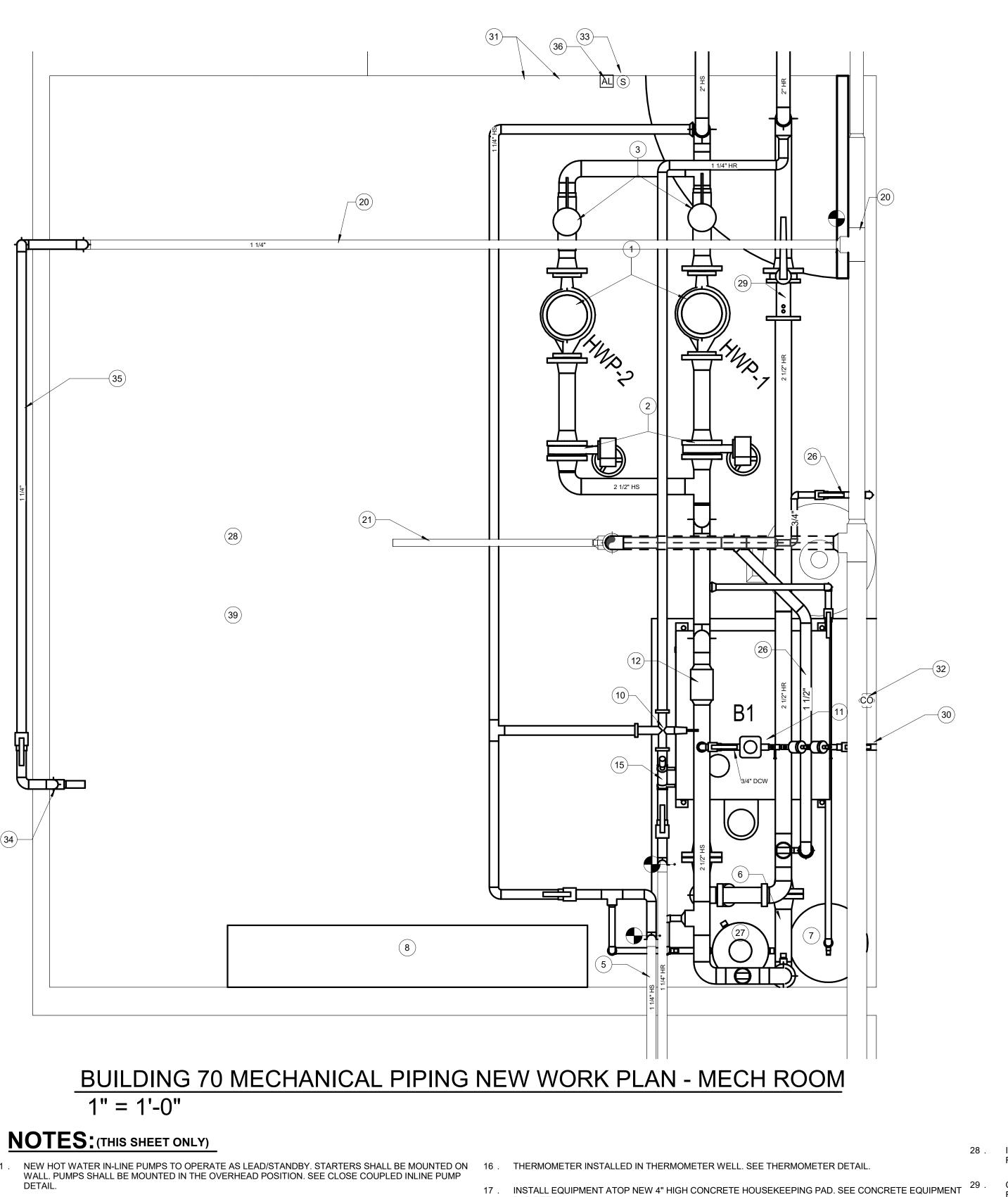
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BLDG. 70 MECHANICAL PIPING
NEW WORK PLAN

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- 2. BUTTERFLY VALVE.
- 3. TRIPLE DUTY VALVE.
- 5. EXISTING HOT WATER PIPING TO EXISTING BASEBOARD HEATERS.
- CONNECT HOT WATER SUPPLY AND RETURN PIPING TO NEW CONDENSING BOILER. SEE HOT WATER
- FLOOR MOUNTED BLADDER TYPE PRESSURIZED ASME STAMPED EXPANSION TANK WITH MINIMUM 5 GALLON ACCEPTANCE VOLUME AND AND 11 GALLON TANK VOLUME. PRECHARGE TANK TO 15PSIG. TACO MODEL NO, CBX42-125.
- ELECTRICAL PANELS IN THIS GENERAL AREA. MAINTAIN ALL REQUIRED CLEARANCES.
- 3-WAY CONTROL VALVE TO CONTROL WEST ZONE BASEBOARD HEATING.
- MAKE UP WATER STATION. SEE MAKE UP WATER STATION DETAIL.
- TACO AIR SCOOP. SEE TACO AIR SCOOP DETAIL
- 13. WYE STRAINER.
- NEW TYPE B GAS VENT FROM EXISTING WATER HEATER ROUTED THROUGH ROOF WITH NEW ROOF PENETRATION. HORIZONTAL PIPING SHALL PENETRATE WALL BELOW HARD CEILING.

17 . INSTALL EQUIPMENT ATOP NEW 4" HIGH CONCRETE HOUSEKEEPING PAD. SEE CONCRETE EQUIPMENT

18. NEW NATURAL GAS HOT WATER HEATING CONDENSING BOILER. SEE EQUIPMENT SCHEDULE

- 19 . INTALL TWO 22" X 20" EGG CRATE GRILLES IN EXISTING VERTICAL COMBUSTION AIR DUCT. CONTRACTOR SHALL MODIFY EXISTING OPENINGS IN DUCT AS REQUIRED. THE NEW GRILES SHALL REPLACE EXISTING GRILLES.
- 20 . EXISTING GAS PIPING ABOVE HARD CEILING, FIELD VERIFY PIPE SIZE.
- 22 . ROUTE NEW STAINLESS STEEL AL29-4C DOUBLE WALL DUCT FROM BOILER EXHAUST THROUGH
- 23 . INSTALL P&T PORTS AS CLOSE TO BOILER INLET/OUTLET AS POSSIBLE
- 24 . ASME PRESSURE RELIEF VALVE WITH FULL SIZE DISCHARGE TO NEAREST FLOOR DRAIN. PROVIDE 60
- 25 . HOT WATER HEATING SUPPLY AND RETURN PIPING PENETRATES WALL ABOVE HARD CEILING. PIPING ROUTES TO TERMINAL UNITS AND BASEBOARD HEATERS.
- 26 . INSTALL NEW NATURAL GAS PIPING TO EXISITNG DOMESTIC WATER HEATER AND TO NEW
- 27 . ONE SHOT CHEMCIAL FEED SYSTEM. SEE DETAIL FOR ADDITIONAL INFORMATION.

- INSTALL NEW RTU-1 ATOP EXISTING ROOF CURB. USE CURB ADAPTER AS
- CALIBRATED STEEL VENTURI WITH EXTENDED NECK AT P&T PORTS FOR MANUAL
- CONNECT MAKEUP WATER STATION TO DOMESTIC WATER.
- CONTRACTOR SHALL INSTALL TWO NEW MOTOR STARTERS TO CONTROL THE
- CONTRACTOR SHALL INSTALL A NEW CARBON MONOXIDE SENSOR ON THE WALL NEAR THE NEW BOILER IN THE MECHANICAL ROOM. SENSOR SHALL SHUTDOWN
- BOILER EMERGENCY SHUTDOWN SWITCH. SWITCH SHALL BE RED MUSHROOM HEAD TYPE. PROVIDE ENGRAVED BAKELITE LABEL ENGRAVED AS FOLLOWS,
- NATURAL GAS CONNECTION TO RTU-1. SEE RTU NATURAL GAS CONECTION
- NEW NATURAL GAS PIPING ROUTED ON ROOF.
- NEW REMOTE ALARM LED INDICATOR FOR DUCT MOUNTED SMOKE DETECTOR
- 37 . EXISTING EXHAUST FAN.
- NEW SUPPLY AIR GRILLE. GRILLE SHALL BE EQUIPED WITH DOUBLE DEFLECTION LOUVERS. SEE GRILLE SCHEDULE.

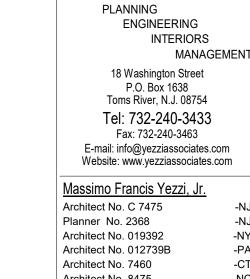
INSTALL NEW 5/8" TYPE X GYPSUM BOARD TO MATCH EXISITNG, ALL PENETRATIONS TO BE SEALED AND MAINTAIN EXISITNG FIRE

BUILDING 70 MECHANICAL ROOM (3D)

EXISTING EXHAUST GRILLE IN MECHANICAL ROOM HARD CEILING. EXISITNG EXHAUST DUCT IS ROUTED TO EXISTING FAN ON ROOF. FIELD VERIFY EXACT DUCT LOCATION AFTER REMOVAL OF HARD

# GENERAL NOTES:(This Sheet Only)

CONTRACTOR SHALL SEE PHASING PLAN FOR INSTRUCTIONS



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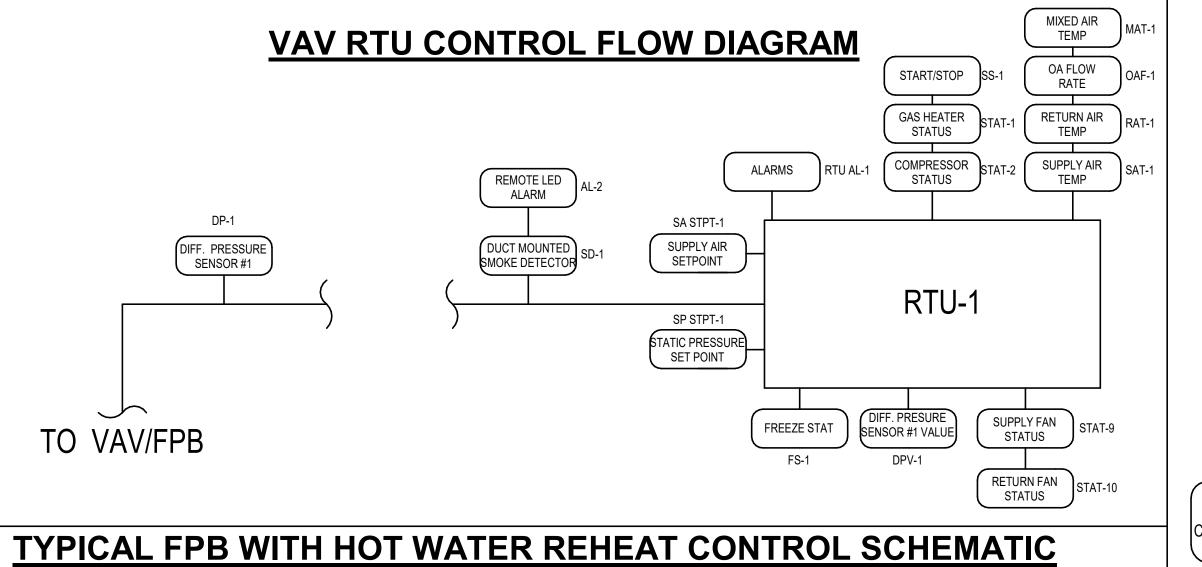
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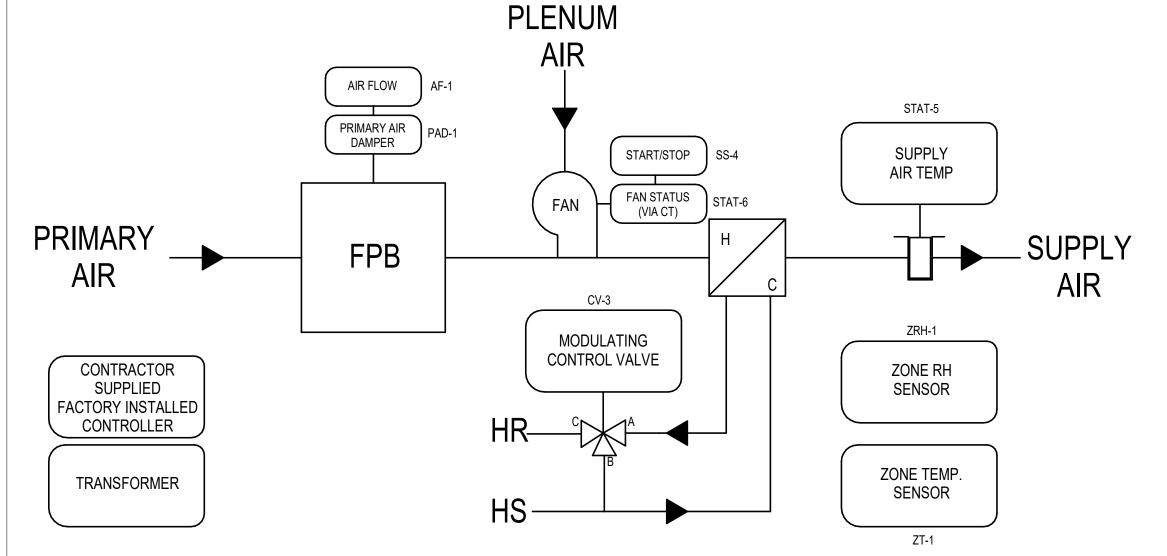
BLDG.70 MECHANICAL NEW WORK PLAN (MECH ROOM)

CWH

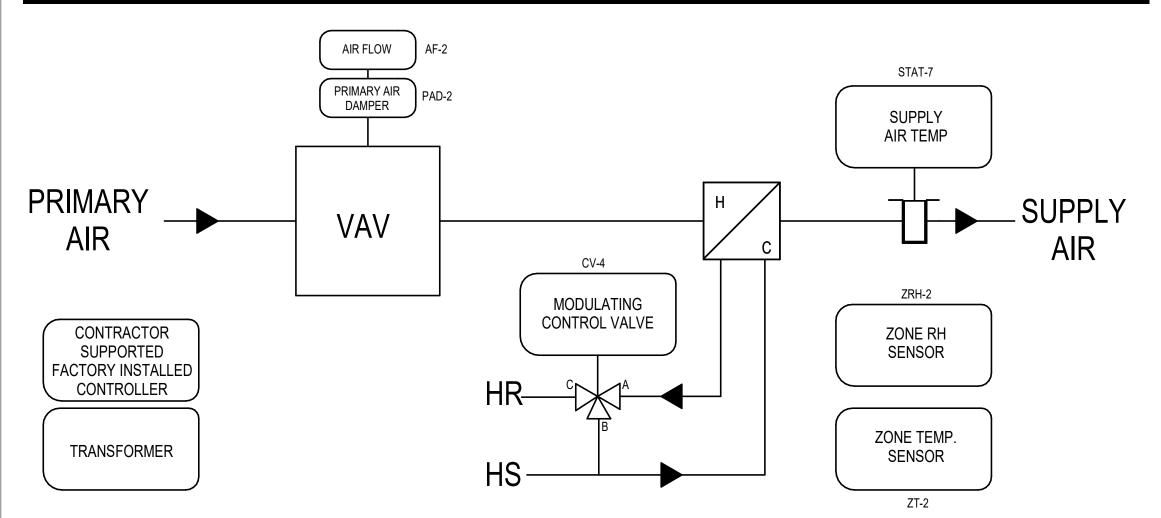
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15 . MANUAL BALANCING VALVE SET FOR 16 GPM. OWNERSHIP OF DOCUMENTS: This document, ideas and designs incorporated herein, are instruments of professional service and are the property of Yezzi Associates and are the property of Yezzi Associates and are not to be used, copied or reproduced in whole or in part without approval of Yezzi Associates to insure conformance with clients scope to

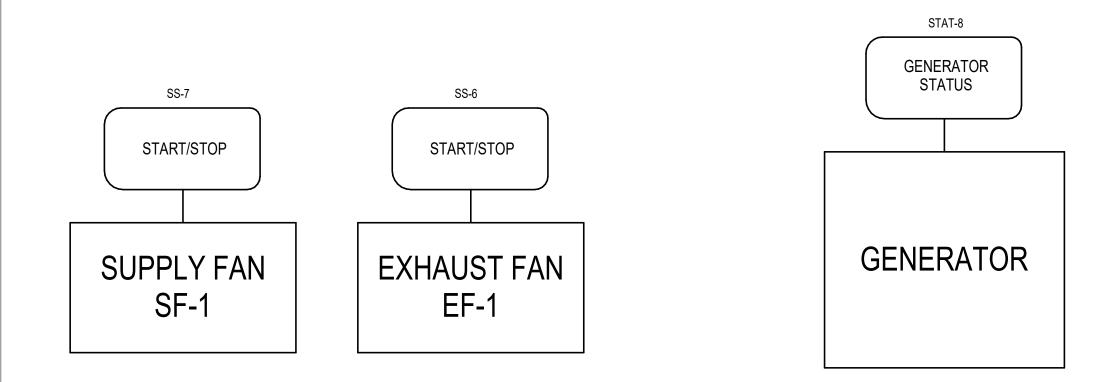


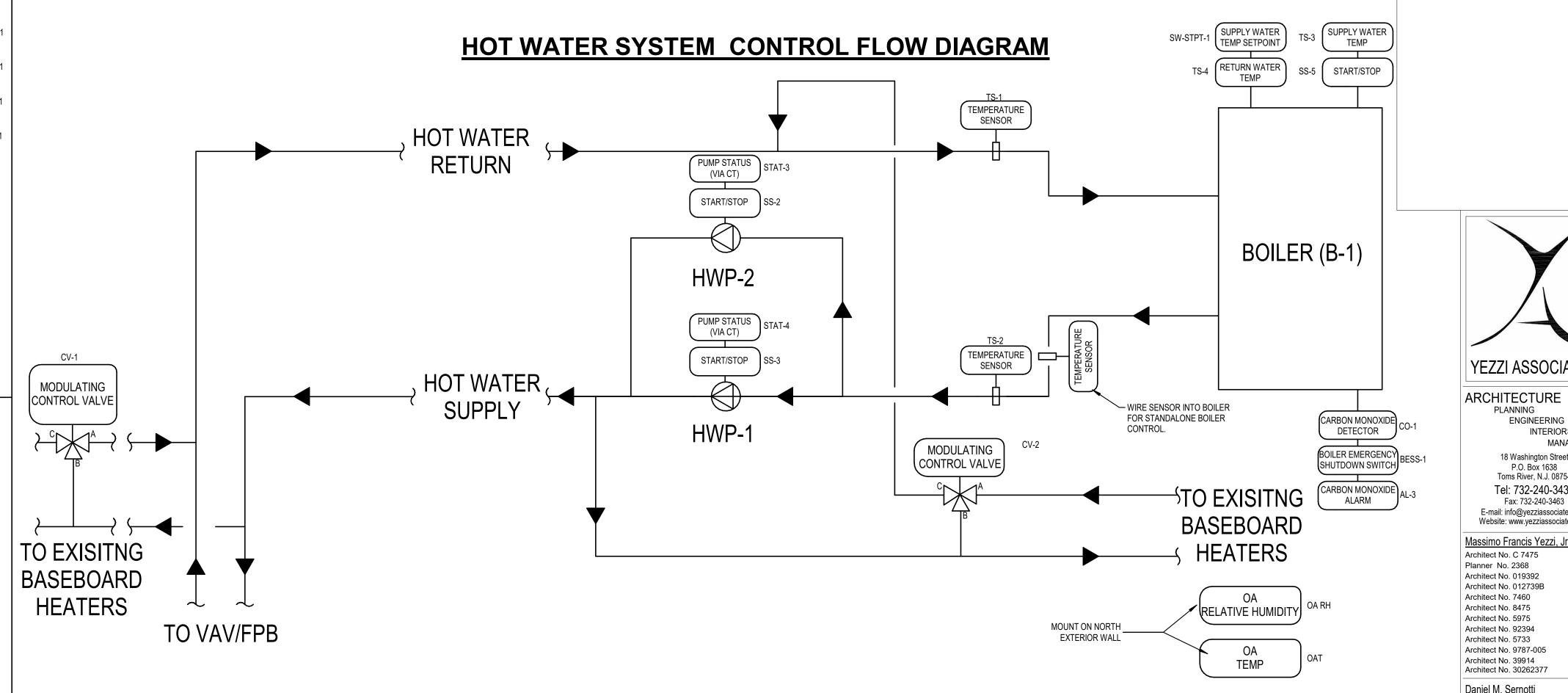


# TYPICAL VAV BOX WITH HOT WATER REHEAT CONTROL SCHEMATIC



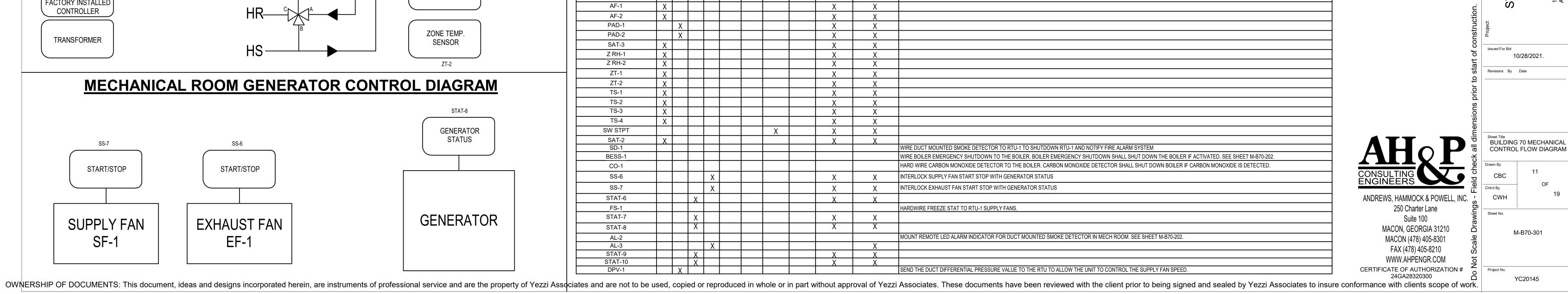
# MECHANICAL ROOM GENERATOR CONTROL DIAGRAM





				<u> </u>			. <b>_</b>		1	
		ARDV POIN					PUT VIA	1	SHOW ON	
POINT NAME	AI	АО	DI D		CKNET	BACK	NET BV	TREND	1 00 100	NOTES:
DP-1	Х							Х	Х	
SP STPT-1						Х		Х	Х	
SA STPT-1						X		Х	X	
STAT-1		$\sqcup$		X				X	X	
STAT-2				X		<u> </u>	ļ	Х	X	
MAT-1	_			X				Х	X	
OAF-1		$\vdash$		X				X	X	
RAT-1			_	X		-	+	X	X	
SAT-1 RTU AL-1		$\vdash$		X	V	<del>                                     </del>		X	X	
CV-1		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			X	<del>                                     </del>	+	X	X	
CV-1	+	X	-+	+		+	+	X	X	
CV-3	-	X		+		1	<del>                                     </del>	\ \ \ \ \ \	X	
CV-4	+	X	+	+		+	+	X	X	
SS-1		^				+	T v	Y	^ Y	
SS-2			-	<del>(                                     </del>		1	<del>  ^</del>	Y	X X	
SS-3				$\overline{\langle}$		†	†	X	X	
SS-4								X	X	
SS-5							X	X	X	
STAT-3			Х			1	1 ~	X	X	
STAT-4			Х					Х	Х	
STAT-5			Χ					Х	Х	
OAT	Х							Х	Х	MOUNT ON NORTH EXTERIOR WALL
OA RH	Х							Х	X	MOUNT ON NORTH EXTERIOR WALL
AF-1	Х							Х	X	
AF-2	X					ļ	ļ	X	X	
PAD-1		X						X	X	
PAD-2		Х			_	-	-	X	X	
SAT-3 Z RH-1	X							X	X	
Z RH-2	X	$\vdash$	+	+		+	+	\ \ \ \ \ \ \	X	
ZT-1	X					+		\ \ \ \ \ \	X	
ZT-2	X	$\vdash \vdash$	$\dashv$	+-		+	+	X	X	
TS-1	X		-+	+		<del>                                     </del>	<del>                                     </del>	X	X	
TS-2	$\frac{1}{X}$	$\vdash$	$\dashv$	+		1	1	X	X	
TS-3	X			_		1	1	X	X	
TS-4	X	$\Box$		$\dashv$		1	1	X	X	
SW STPT						Х		Х	Х	
SAT-2	Х							Х	Х	
SD-1		<del>                                     </del>								WIRE DUCT MOUNTED SMOKE DETECTOR TO RTU-1 TO SHUTDOWN RTU-1 AND NOTIFY FIRE ALARM SYSTEM
BESS-1	_	$\vdash$		+		1	+	-		WIRE BOILER EMERGENCY SHUTDOWN TO THE BOILER. BOILER EMERGENCY SHUTDOWN SHALL SHUT DOWN THE BOILER IF ACTIVATED. SEE SHEET M-B70-202.
CO-1	+	$\vdash \vdash$				1	1			HARD WIRE CARBON MONOXIDE DETECTOR TO THE BOILER. CARBON MONOXIDE DETECTOR SHALL SHUT DOWN BOILER IF CARBON MONOXIDE IS DETECTED.
SS-6		$\sqcup$		(	_			Х	X	INTERLOCK SUPPLY FAN START STOP WITH GENERATOR STATUS
SS-7				(				Х	X	INTERLOCK EXHAUST FAN START STOP WITH GENERATOR STATUS
STAT-6			Х	$\bot$		<del>                                     </del>	<u> </u>	X	X	
FS-1		$\vdash$				<del>                                     </del>				HARDWIRE FREEZE STAT TO RTU-1 SUPPLY FANS.
STAT-7		$\sqcup$	X			<del>                                     </del>		X	X	
STAT-8			Х			<del>                                     </del>	<u> </u>	X	X	MOUNT DEMOTE LED ALADMINDIONTOD FOR DUOT MOUNTED CHOICE DETECTOR IN MEDIA TO COMPANY OF THE COMP
AL-2 AL-3		$\vdash$			_	<del>                                     </del>	<del>                                     </del>			MOUNT REMOTE LED ALARM INDICATOR FOR DUCT MOUNTED SMOKE DETECTOR IN MECH ROOM. SEE SHEET M-B70-202.
AL-0	1			<b>\ I</b>		1	1		X	1

SEND THE DUCT DIFFERENTIAL PRESSURE VALUE TO THE RTU TO ALLOW THE UNIT TO CONTROL THE SUPPLY FAN SPEED.



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Architect No. C 7475

Architect No. 019392

Architect No. 012739B

Planner No. 2368

Architect No. 7460

Architect No. 5975

Architect No. 92394

Architect No. 9787-005

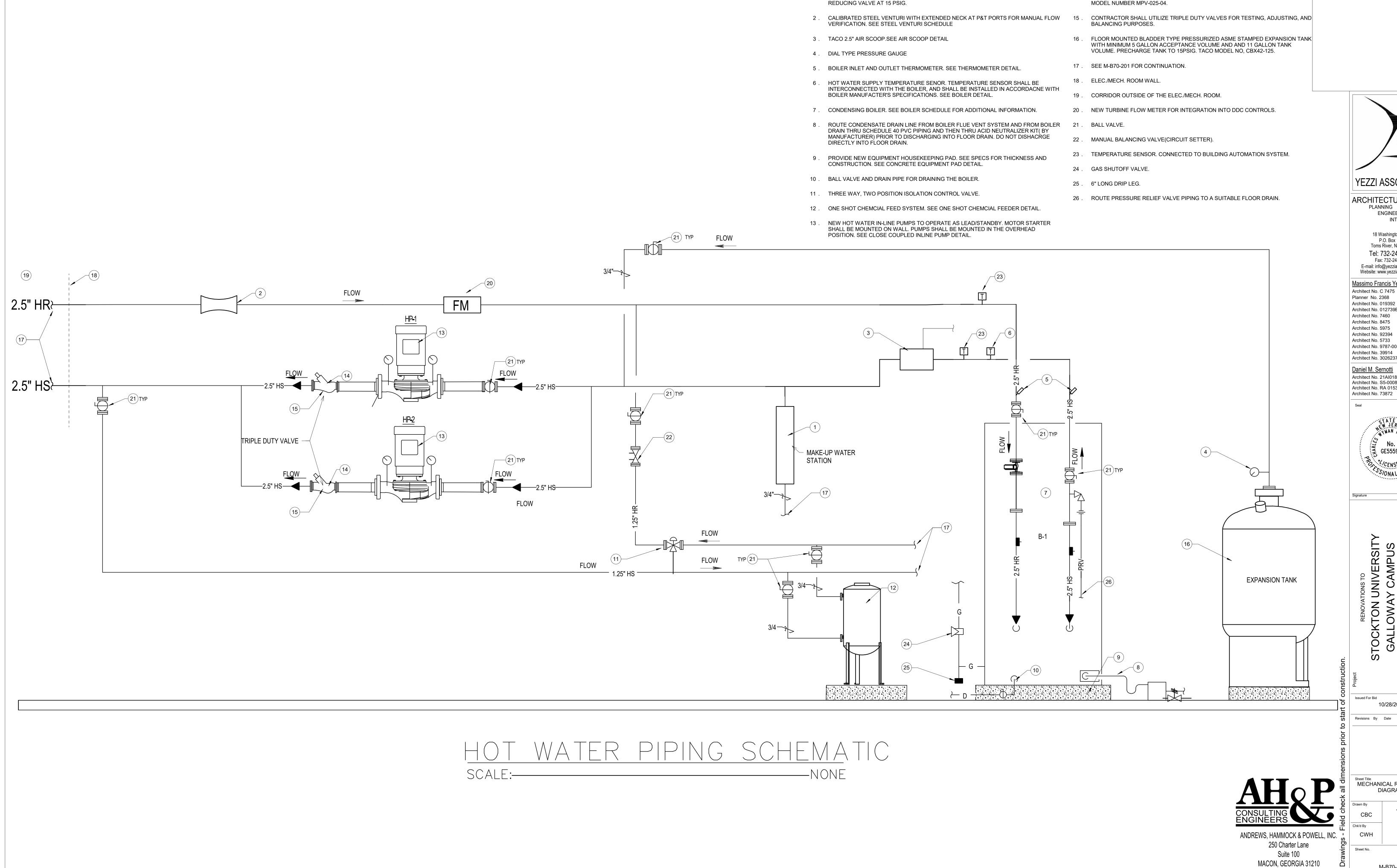
Architect No. 30262377

Architect No. 21AI01897900

STOSIONAL ENGINE

Architect No. S5-0008349 Architect No. RA 015346

Architect No. 5733



NOTES: (THIS SHEET ONLY)

MAKE-UP WATER STATION. SEE MAKE-UP WATER STATION DETIAL. SET PRESSURE

2.5" TRIPLE DUTY VALVE WITH MAXIMUM 5 FEET OF HEAD PRESSURE DROP. TACO MODEL NUMBER MPV-025-04.

YEZZI ASSOCIATES

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Website: www.yezziassociates.com Massimo Francis Yezzi, Jr. Architect No. C 7475 Planner No. 2368 Architect No. 019392 Architect No. 012739B

-CT -NC Architect No. 7460 Architect No. 8475 Architect No. 5975 Architect No. 92394 Architect No. 5733 Architect No. 9787-005 Architect No. 39914 -NCARB Architect No. 30262377

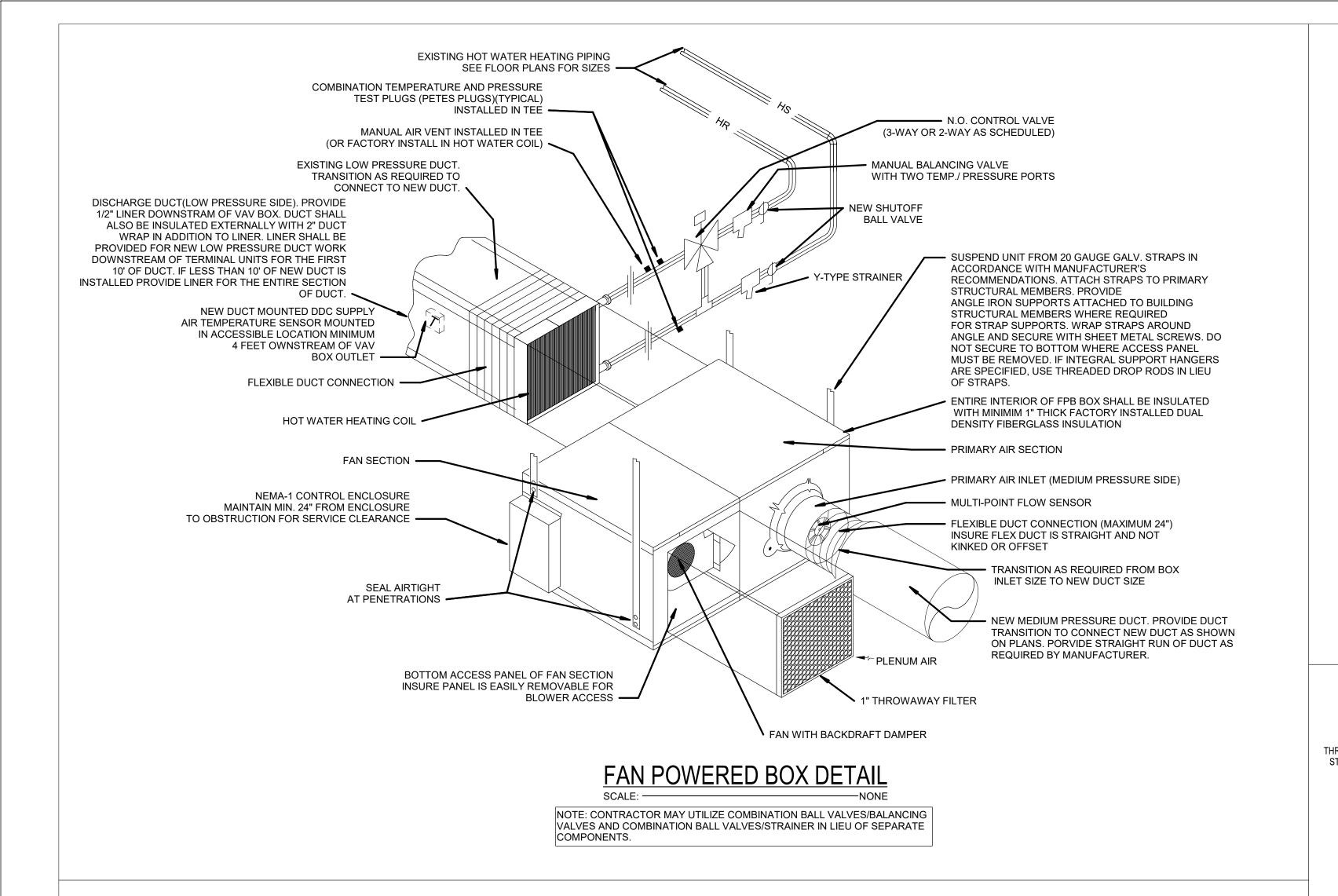
Daniel M. Sernotti Architect No. 21AI01897900 Architect No. S5-0008349 Architect No. RA 015346

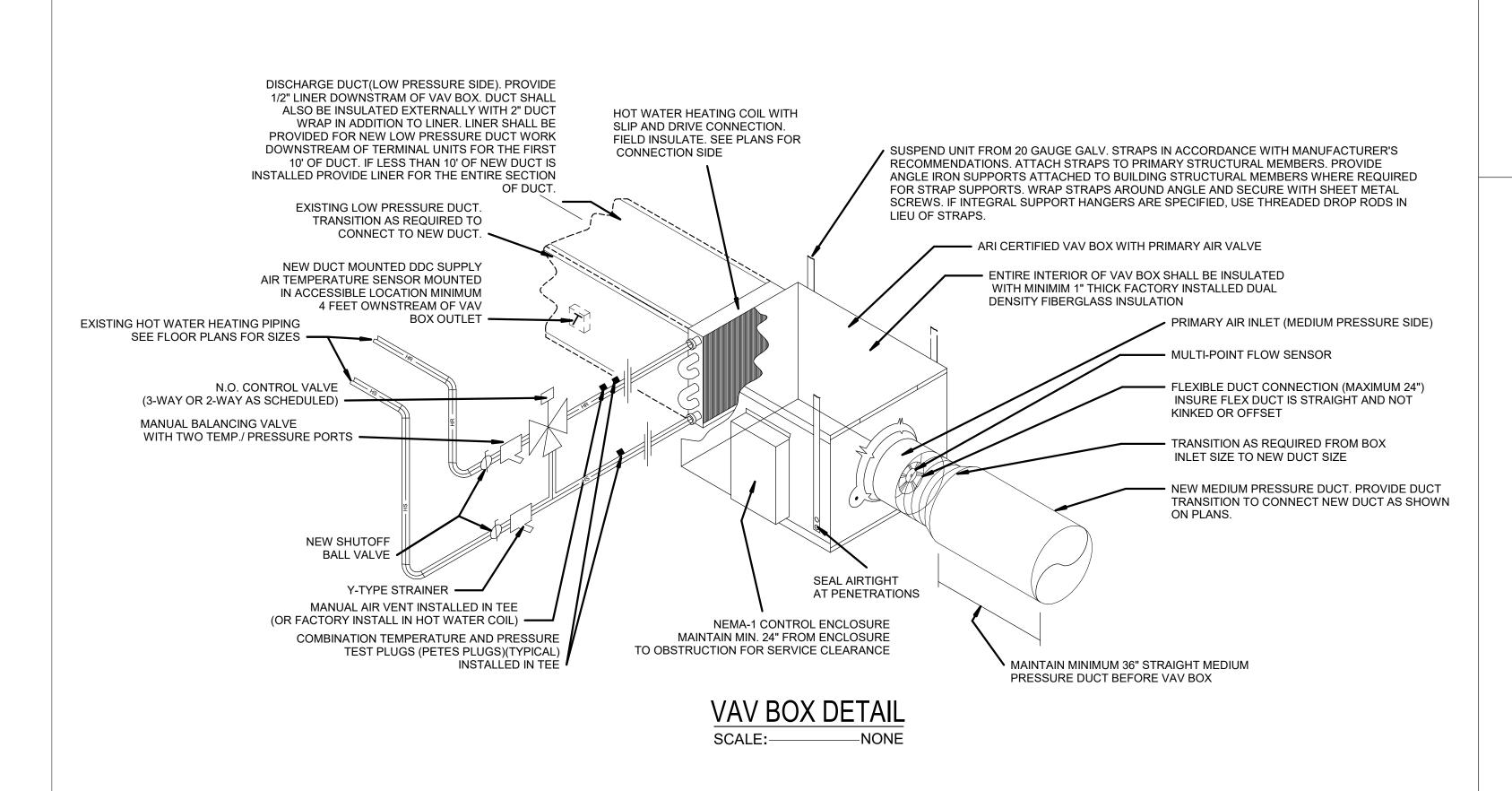
Sheet Title
MECHANICAL RISERS AND
DIAGRAMS

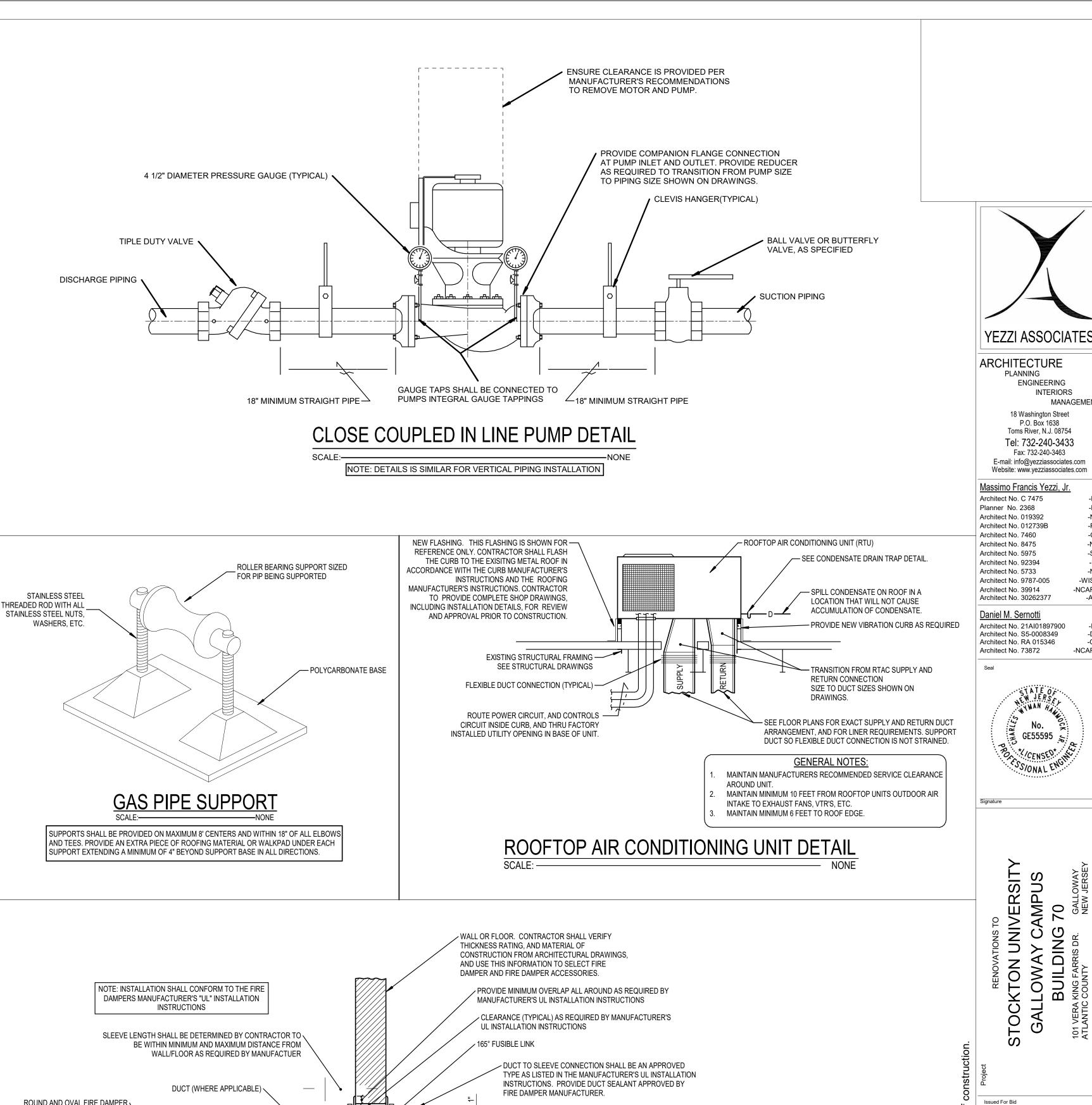
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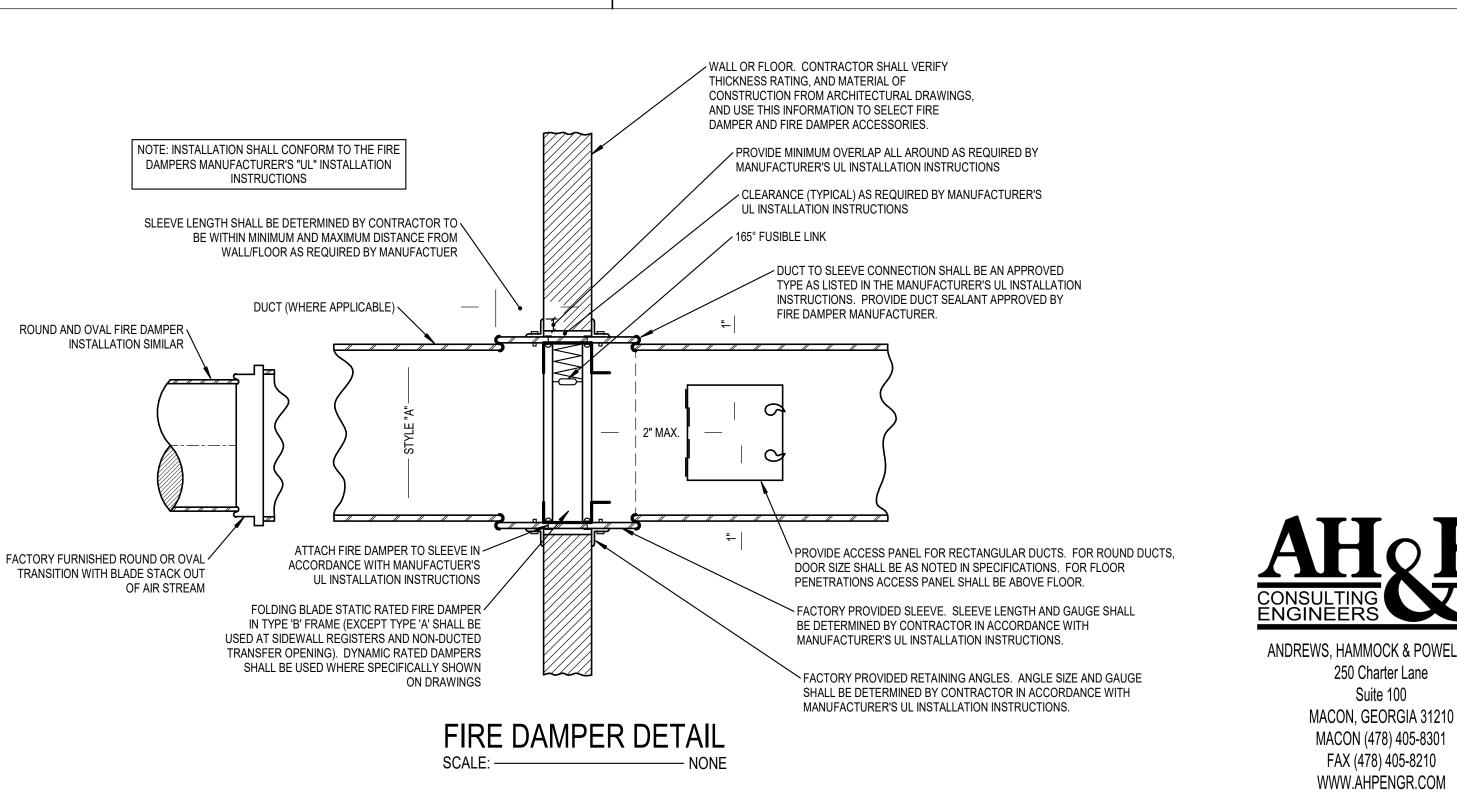
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ANDREWS, HAMMOCK & POWELL, INC

13 CWH Sheet No.

M-B70-401

10/28/2021.

MECHANICAL DETAILS

Revisions By Date

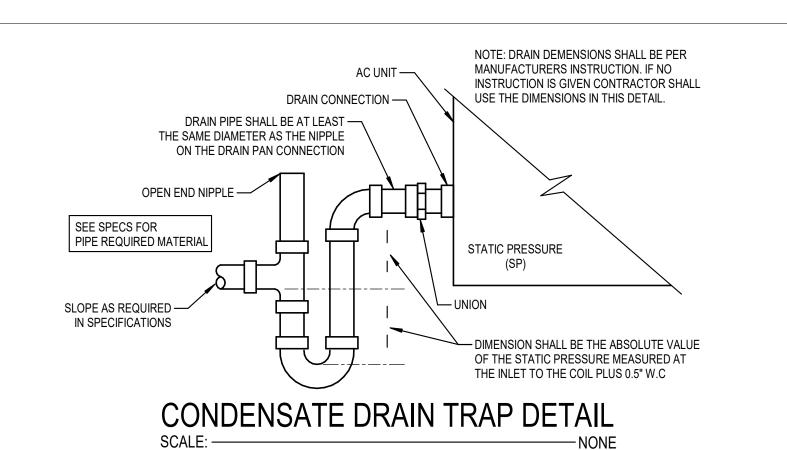
MANAGEMENT

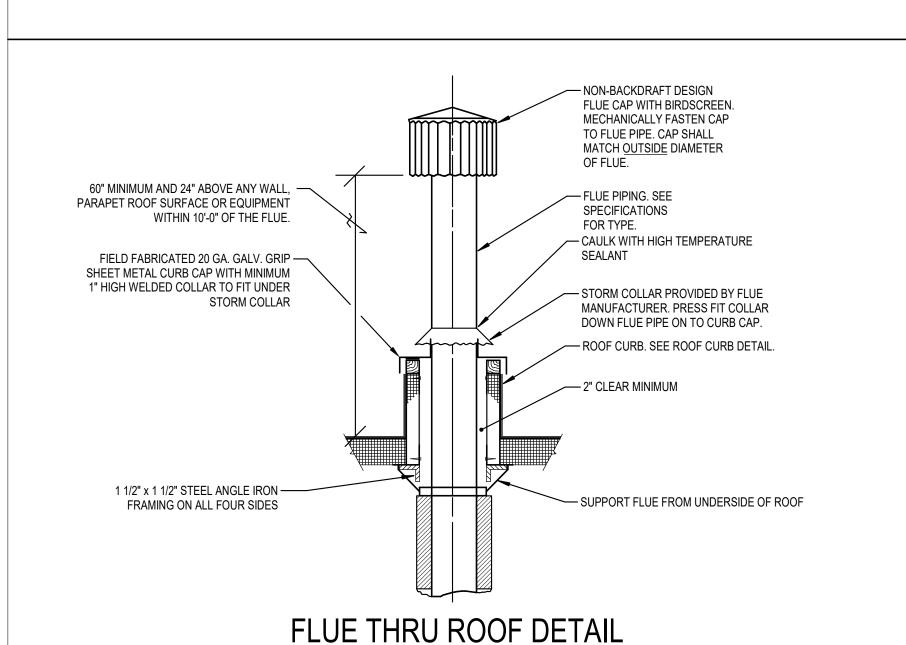
-WISC

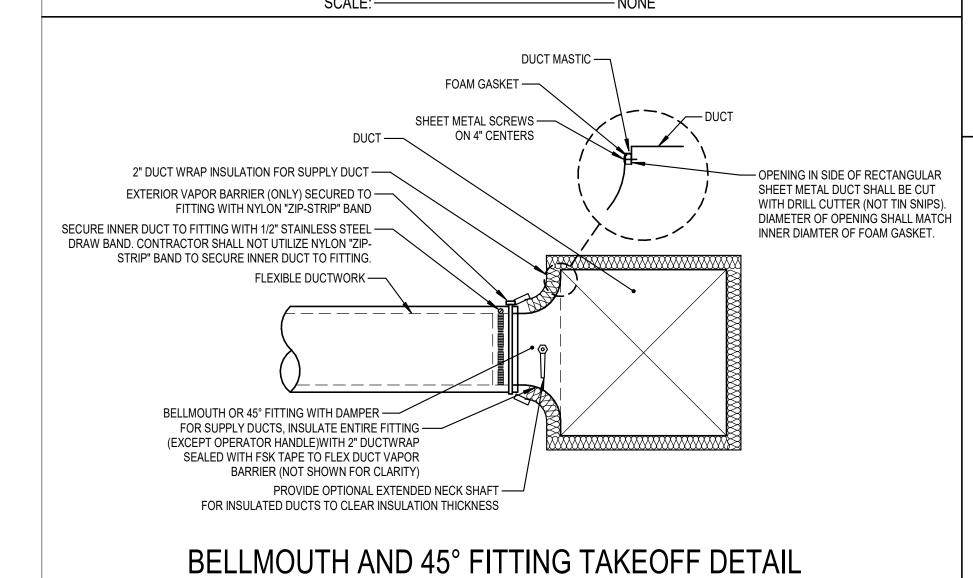
-NCARB

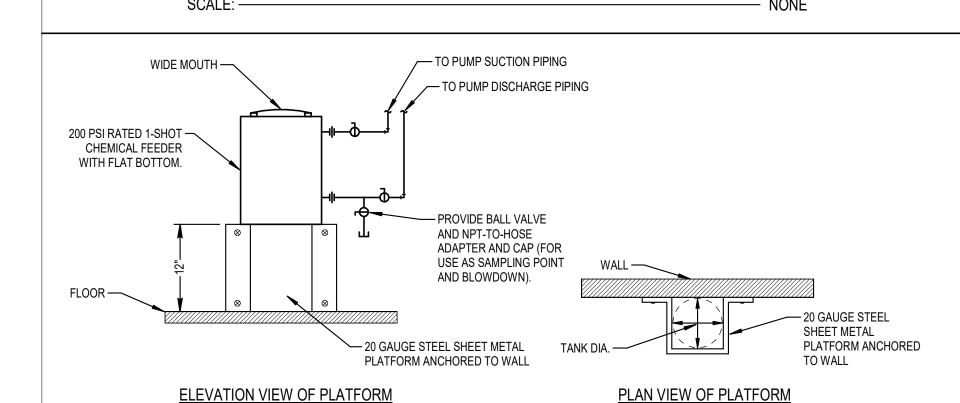
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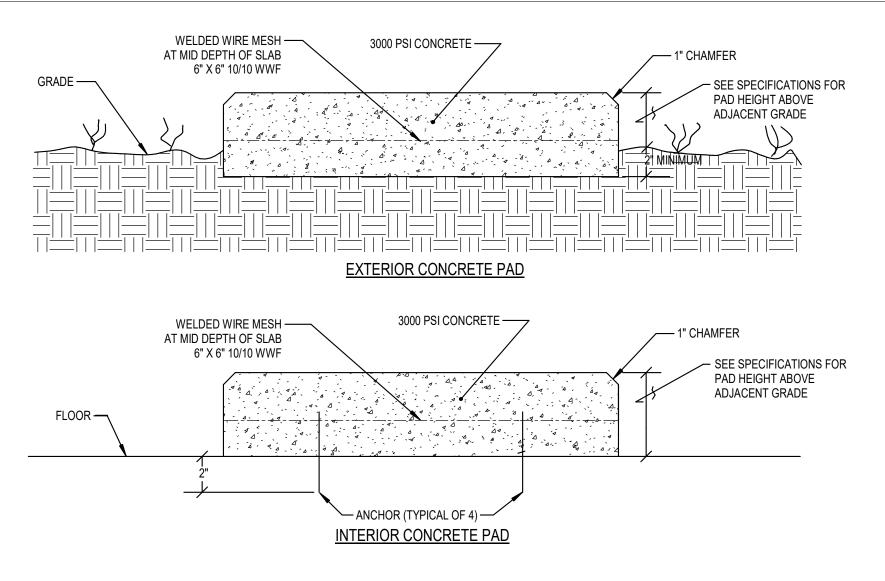




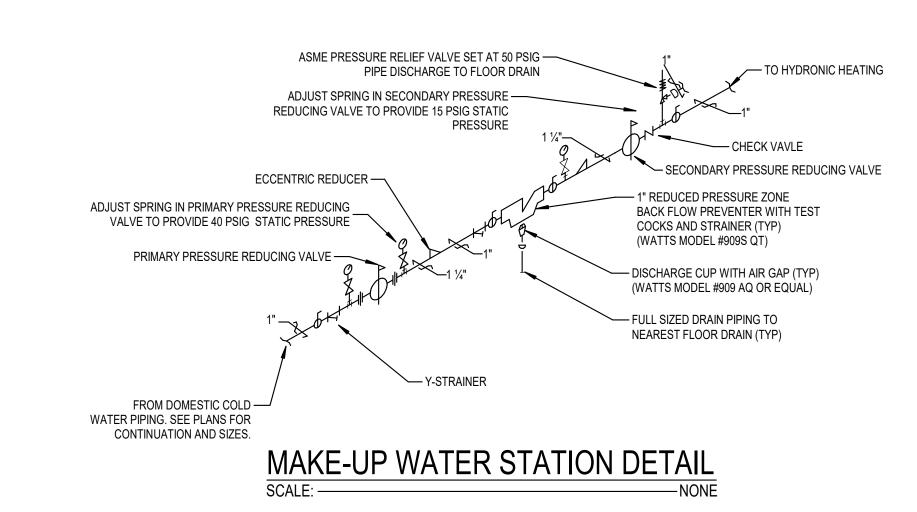


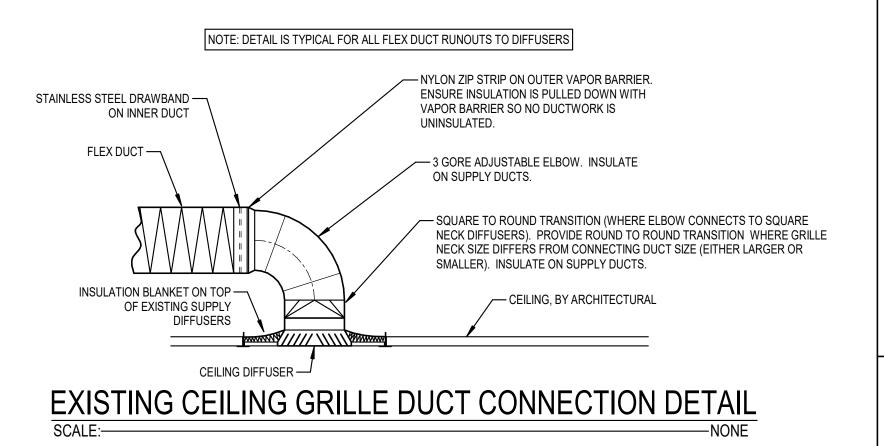


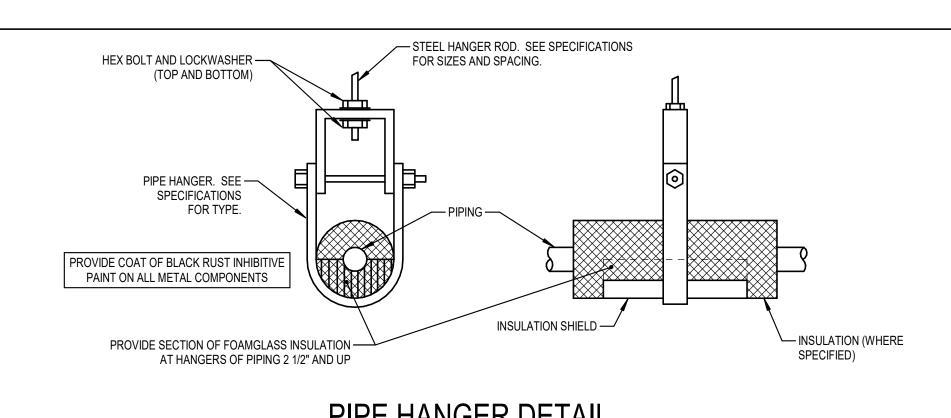
ONE SHOT CHEMICAL FEED SYSTEM DETAIL



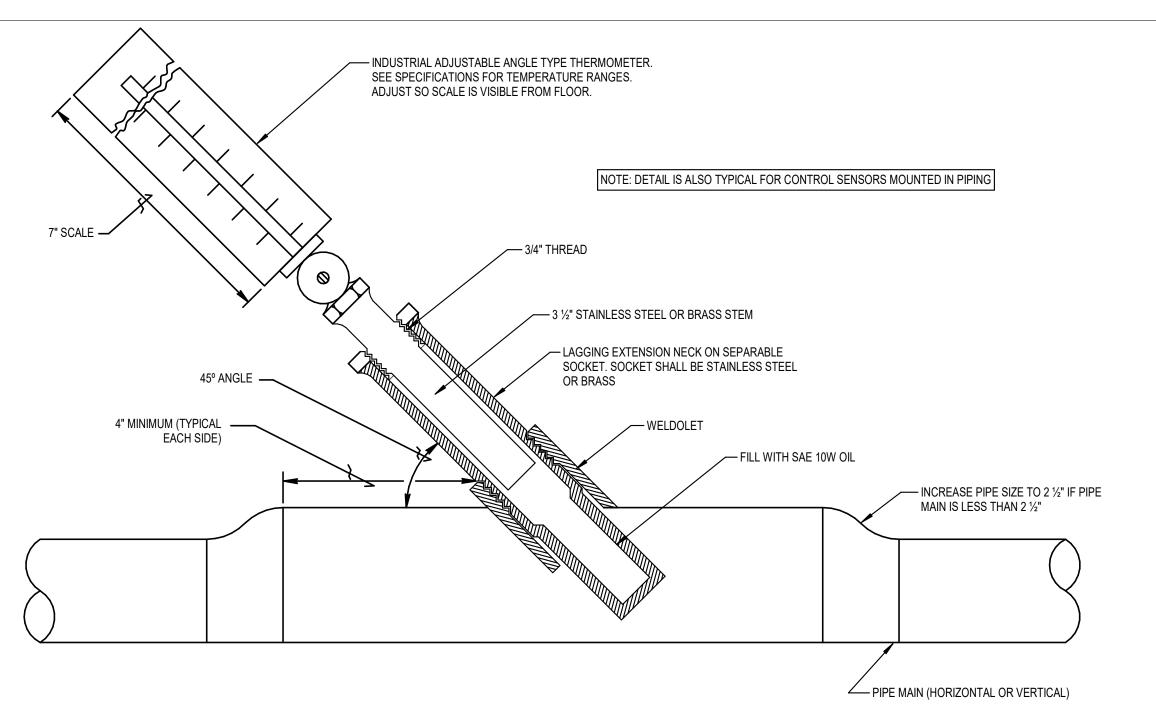
# CONCRETE EQUIPMENT PAD DETAIL



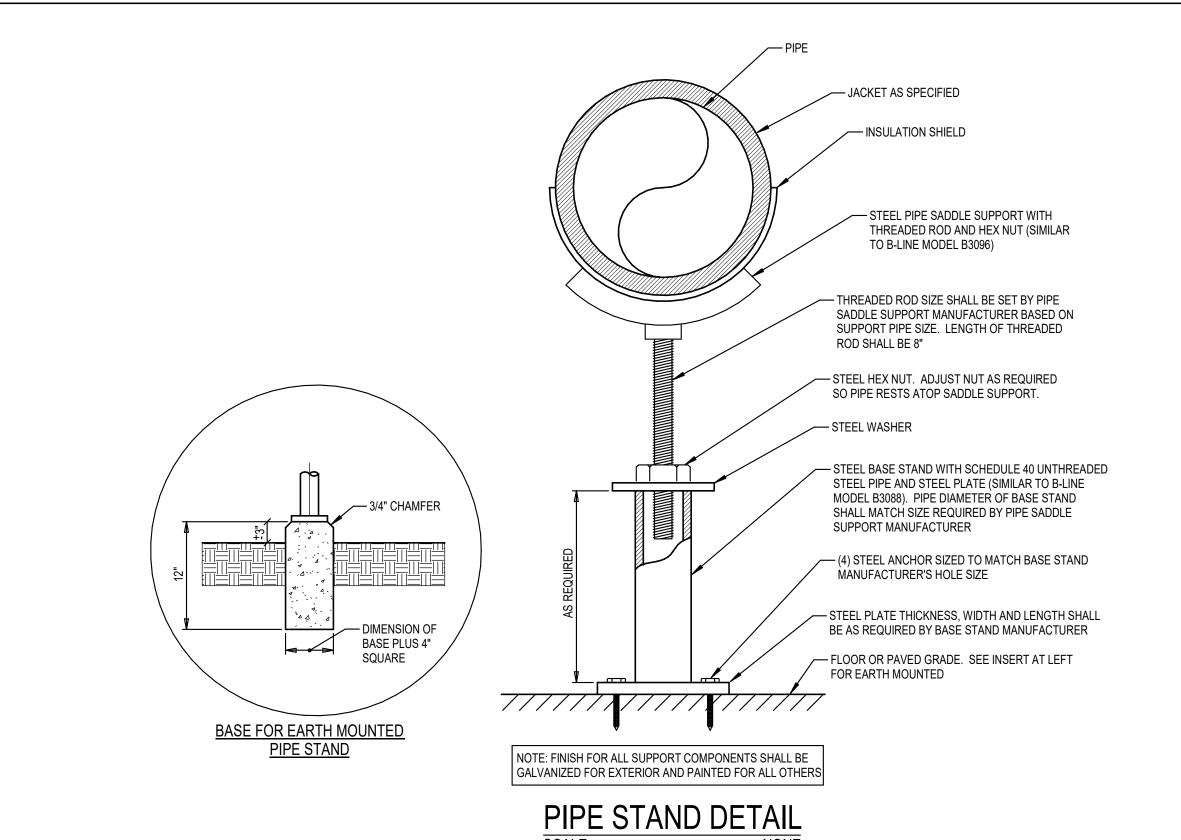


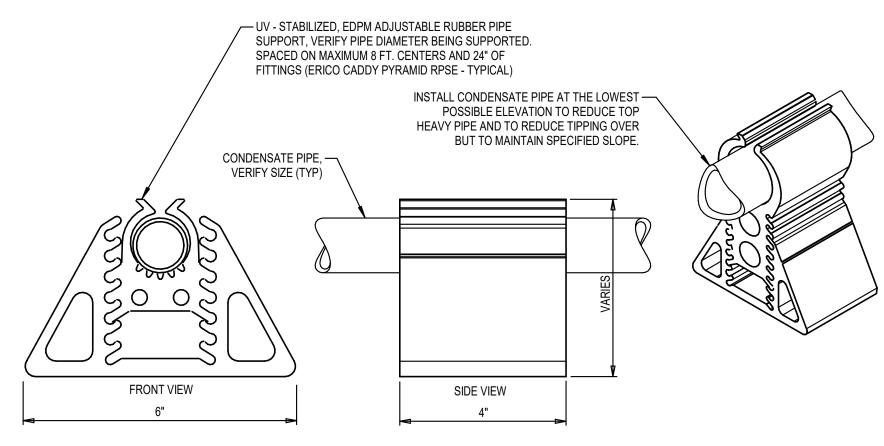


PIPE HANGER DETAIL



# THERMOMETER DETAIL





# CONDENSATE PIPE SUPPORT ON ROOF DETAIL

GENERAL: THIS CONDENSATE SUPPORT SHALL BE USED WITH DRAIN ELEVATIONS ABOVE ROOF OF 7' OR LESS. CONDENSATE ELEVATIONS ABOVE 8" SHALL USE ERICO CADDY PYRAMID ST ADJUSTABLE



250 Charter Lane MACON, GEORGIA 31210 MACON (478) 405-8301 FAX (478) 405-8210

Sheet No. M-B70-402

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Issued For Bid

Revisions By Date

10/28/2021.

MECHANICAL DETAILS

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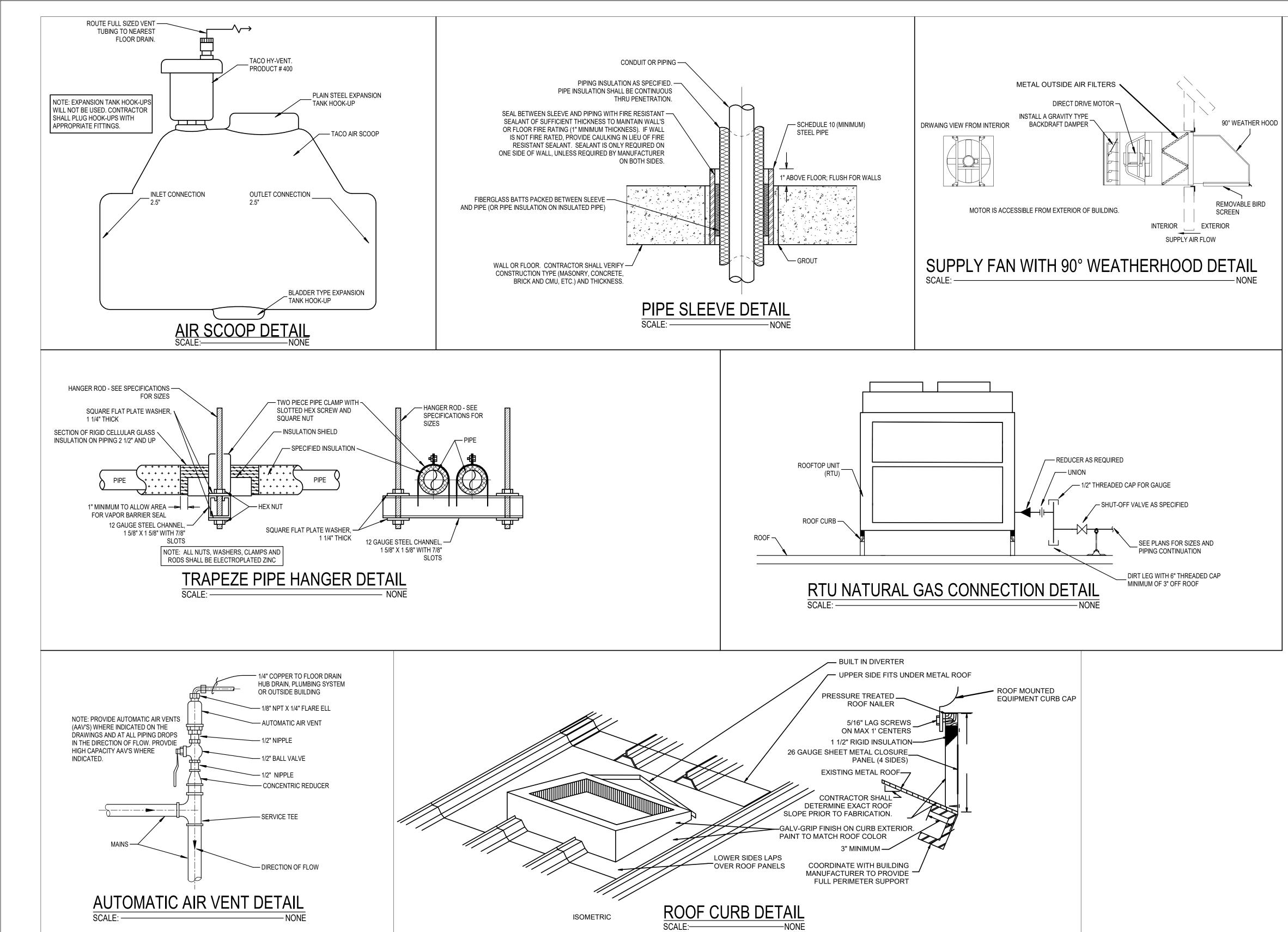
INTERIORS

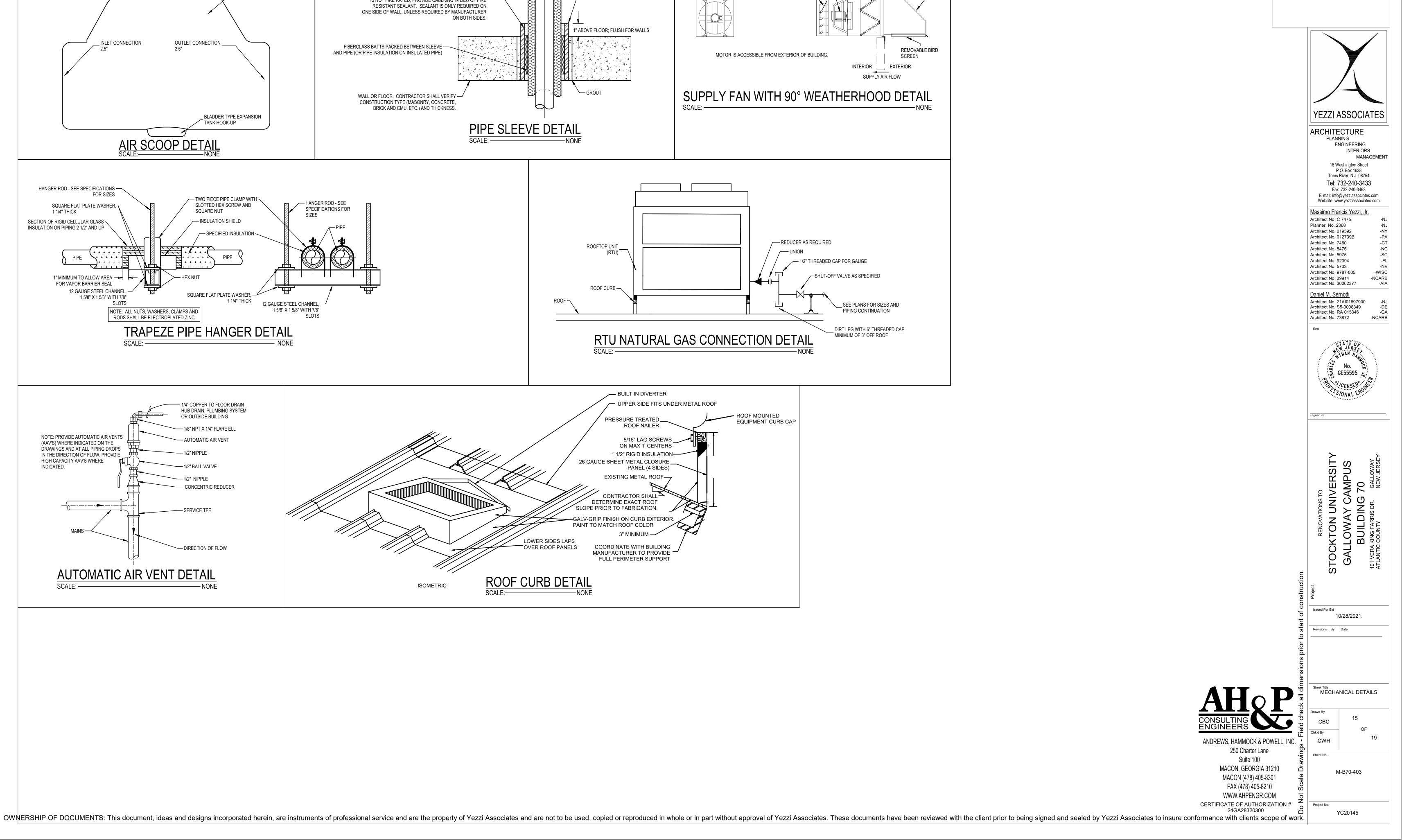
ARCHITECTURE

PLANNING

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				F	AN PO	WERE	ED BOX	ES			
TAG	PRICE MODEL NUMBER	AIR VALVE SIZE	MAX. AIRFLOW	MIN. AIRFLOW	BLOWER CFM	BLOWER MOTOR HP	WC CAPACITY (MBH)	COIL ROWS	HOT WATER GPM	HOT WATER VALVE FLOW ARANGEMENT	NOTES
FPB-1	FDV5	3012	1395	550	560	1/2	40.9	2	2.2	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:
FPB-2	FDV5	2010	810	246	430	1/3	18.9	1	1.1	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
FPB-3	FDV5	2010	825	363	462	1/3	32.3	2	1.5	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:
FPB-4	FDV5	2008	480	230	250	1/8	16.4	1	1.0	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
FPB-5	FDV5	2006	335	112	250	1/8	10.5	1	0.5	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
FPB-6	FDV5	2008	600	125	475	1/3	15.4	1	0.8	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
FPB-7	FDV5	3012	1500	351	746	1/2	54.1	2	3.0	3 WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
FPB-8	FDV5	2008	750	158	349	1/3	16.4	1	1.0	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
FPB-9	FDV5	4012	1140	525	915	1/2	45	2	1.9	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:
FPB-10	FDV5	2010	1100	569	300	1/3	47.3	2	2.3	3 WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14

- PRESSURE INDEPENDENT VARIABLE VOLUME PARALLEL FLOW FAN POWERED BOX WITH HOT WATER COIL.
- FAN POWERED BOX SHALL BE ARI CERTIFIED AND BEAR THAT LABEL
- FAN POWERED BOX SHALL HAVE FACTORY MOUNTED MULTI-POINT RING OR CROSS FLOW SENSOR.
- PROVIDE MODULATING ELECTRONIC DDC HOT WATER VALVE. SEE SCHEDULE FOR FLOW ARRANGEMENT (3 WAY)
- DISCHARGE AND RADIATED SOUND LEVEL IN COOLING CYCLE NOT TO EXCEED NC20 AND 27 RESPECTIVELY, AND IN HEATING CYCLE NOT TO EXCEED NC22 AND 42 RESPECTIVELY, PER ARI STANDARD 885-98, APPENIX E WITH TYPE 2 MINERAL FIVER CEILING AND 0.5" PRESSURE DIFFERENTIAL ACROSS BOX, AND WITH 5 FEET LINED DUCT.
- PROVIDE HOT WATER COIL MOUNTED ON DISCHARGE. COIL SHALL HAVE GALVANIZED STEEL CASING AND COPPER COILS. HEATING CAPACITY BASED ON 180°F ENTERING WATER TEMPERATURES, AND 70°F ENTERING AIR TEMPERATURE FOR BLOWER CFM. PROVIDE RIGHT OR LEFT HAND COIL CONNECTIONS AS SHOWN ON PLANS.
- PRIMARY AIR VALVE CFM SHALL NOT EXCEED MANUFACTURER'S NOMINAL CFM OR 0.4" W.C. PRESSURE DROP. VELOCITY THROUGH VALVE SHALL NOT EXCEED 2300 FPM.
- SEE FAN POWERED BOX DETAIL.
- PROVIDE 1" THICK FIBERGLASS LINING.
- PROVIDE FILTER CLIPS/RACK ON UPSTREAM SIDE OF HOT WATER COIL DESIGNED FOR 1" THROW AWAY FILTERS.
- PROVIDE CONTROL ENCLOSURE. PROVIDE RIGHT OR LEFT HAND CONTROL ENCLOSURE SIDE AS SHOWN ON PLANS.
- PROVIDE DIRECT DRIVE FAN WITH ECM MOTOR, MOTOR VIBRATION ISOLATOR MOUNTS, THERMAL OVERLOAD PROTECTION, PERMANENTLY LUBRICATED BEARINGS, BACKDRAFT DAMPER AT FAN 12.
- MANUFACTURER SHALL FACTORY MOUNT AND WIRE DDC CONTROLLER,ACTUCATOR,AND CONTROL TRANSFORMER AT EACH BOX. DDC CONTROLLER AND ACTUATOR SHALL BE FURNISHED BY SUCCESSFULL CONTROLS CONTRACTOR TO BOX MANUFACTURER. TRANSFORMERS SHALL BE PROVIDED BY FAN POWERED BOX MANUFACTURER.
- PROVIDE HIGH CAPACITY HOT WATER COIL

	•	VENTU	IRI SC	HEDU	ILE	
TAG	GRISWOLD MODEL NO.	EQUIPMENT SERVED/FLUID	MAX. GPM	SIZE	CV FOR PERMANENT PRESSURE DROP	NOTES
V-1	3QFMOT	HOT WATER LOOP	87	2.5	171	1:2:3:4:5
1 CON	ITRACTOR SHA	LL SELECT METER	RING STATION	VALVE STYLE		

- 2 OPTIONAL 3"X3" ALUMINUM HANGING I.D. TAG SHALL BE INCLUDED
- 3 CARBON STEEL VENTURI WITH HIGH SIGNAL/ LOW LOSS DESIGN WITH THREE PORT AVERAGING
- 4 PROVIDE FLANGED END CONNECTIONS (IF CONTRACTOR PROVIDES GROOVED PIPING, PROVIDE GROOVED CONNECTIONS)
- 5 INSTALL VENTURI WITH MINIMUM FIVE STRAIGHT PIPE DIAMETERS UPSTREAM OF VENTURI

**GRILLE SCHEDULE** 

ΓAG	PRICE MODEL NO.	CONN. SIZE	FINISH	THROW AND/OR APPLICATION	NOTES	
Α	80	22 x 20	WHITE	COMBUSTION AIR	1:4	
В	80	48 x 62	WHITE	RETURN AIR	1:2:3	
С	620S	24 X 14	WHITE	SUPPLY AIR	5	

- 1 PROVIDE FLANGED FRAME FOR SURFACE MOUNT APPLICATION.
- PROVIDE 1x1x1 (EGG CRATE) ALL ALUMINUM RETURN GRILLE IN MULTIPLE SECTIONS AS REQUIRED TO ACHIEVE SCHEDULED DIMENSIONS.
- PROVIDE MINIMUM 93% FREE AREA.
- 4 PROVIDE MINIMUM 91% FREE AREA.
- 5 GRILLE SHALL BE EQUIPED WITH A DOUBLE DEFLECTION LOUVER

#### CCHEDITIE DOLLEDO

					2CHED	OLE - B	JILEK	
TAG	RAYPAK MODEL NUMBER	INPUT MBH	OUTPUT MBH	GPM	SUPPLY TEMP (°F)	RETURN TEMP (°F)	MAX P.D. (FT. HEAD)	NOTES
B-1	H7-606L	600	586	52	180	157.5	3.5	1:2:3:4:5:6:7:8:9:10:11:12

CONDENSING BOILER WITH STAINLESS STEEL HEAT EXCHANGER.

2. HEATING CAPACITY BASED ON FIRING NATURAL GAS.

- PROVIDE ASME PRESSURE RELIEFT VALVE SET AT 60 PSIG. PROVIDE MANUFACTURER FURNISHED, FIELD INSTALLED PADDLE FLOW SWITCH.
- BOILER SHALL BE AHRI REGISTERED FOR MINIMUM THERMAL EFFICIENCY OF 96% AT FULL FIRE. BOILER SHALL OPERATE W/ MINUMUM CSA CERTIFIED THERMAL EFFICIENCY OF 96%. BOILER SHALL BE DESIGNED FOR OPERATION WITH LOW RETURN WATER TEMPERATURES.
- PROVIDE GAS TRAIN WITH MODULATING FIRING CONTROLS AND (MINIMUM) 7:1 TURNDOWN. INTERLOCK CONTROLS WITH FACTORY INSTALLED FLOW SWITCH. BOILER CONTROLS SHALL BE ENERGIZED/DEENERGIZED BY SIGNAL FROM DDC SYSTEM.
- PROVIDE PROBE TYPE LOW WATER CUT-OFF, INSULATED JACKET, COMBUSTION AIR PROVING SWITCH, PRESURE TEMPERATURE GAUGE, MANUAL RESET HIGH TEMPERATURE CUT-OFF, AND A CONDENSATE TRAP FOR THE HEAT EXCHANGER CONDENSATE DRAIN. BOILER SHALL CONTROL TO DISCHARGE WATER SETPOINT. BOILER SETPOINT ADJUSTMENT SHALL BE BY DDC CONTROL SYSTEM.
- 7. BOILER SHALL BE ASME 'H' STAMPED
- 8. MOUNT ATOP 4" CONCRETE PAD. SEE CONCRETE EQUIPMENT PAD DETAIL.
- 9. BOILER SHALL BE VENTED WITH CATEGORY IV APPROVED DOUBLE WALL AL294C STAINLESS STEEL, SEALED FLUE VENT MATERIAL. PROVIDE FACTORY FURNISHED CONDENSATE NEUTRALIZATION KIT.
- 10. PROVIDE FACTORY AUTHORIZED STARTUP AND STARTUP REPORT.
- 11. PROVIDE BACNET CONTROLS FOR CONTROL AND MONITORING BY DDC.
- BOILER PRESSURE DROP BASED ON PUBLISHED DATA BY MANUFACTURER AND CORRESPONDING PUMP IS SIZED WITH THIS PRESSURE DROP. IF BOILER WITH HIGHER PRESSURE DROP IS PROVIDED, CONTRACTOR IS RESPONSIBLE FOR PROVIDING ASSOCIATED PUMP WITH HIGHER HEAD TO COMPENSATE FOR HIGHER PRESSURE DROP.

			F/	N SC	HEDUL	.E		
MARK	GREENHECK MODEL NO.	MOTOR HP	MOTOR BHP	FAN RPM	PRESSURE DROP	SONES	CFM	NOTES
SF-1	S1-14	1/4	0.29	1750	0.24" WC	12.9	1600	1:2:3:4
1	FAN SHALL BE I	EQUIPPED WITH	H A 90° WEATHER	RHOOD.				
2	FAN SPEED SHA	ALL BE CONTRO	OLLED BY A SPE	ED CONTROLLE	ER. SEE SPECIFIC	CATIONS FOR M	ORE INFORM	ATION.
3	FAN SHALL BE I BE ACCESSED	,		KDRAFT DAMPE	ER. THE BACKDRA	AFT DAMPER SH	HALL BE INST	ALLED SO THAT THE MOTOR CA
4	PROVIDE DIREC	CT DRIVE MOTO	R.					

					V	/AV B	OXES			
TAG	TITUS MODEL NO.	SIZE	MAX. AIRFLOW	MIN. AIRFLOW	HEATING / REHEAT CFM	HEATING CAPACITY MBH	HOT WATER GPM	COIL ROWS	HOT WATER VALVE FLOW ARANGEMEN T	NOTES
VAV-1	SDV5	4	150	65	150	6.6	0.5	1L	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
VAV-2	SDV5	4	150	63	150	6.5	0.5	1L	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
VAV-3	SDV5	4	150	54	150	6.1	0.4	1L	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
VAV-4	SDV5	4	190	56	169	10.4	0.5	2L	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
VAV-5	SDV5	4	260	143	260	10.0	1.0	1L	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
VAV-6	SDV5	4	300	160	240	9.2	0.8	1L	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
VAV-7	SDV5	4	350	156	295	18.1	1.0	2L	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
VAV-8	SDV5	4	215	141	215	9.3	0.3	2L	3-WAY	1:2:3:4:5:6:7:8:9:10:11:12:13:14
1.	PRESSURE IN	DEPENDENT VA	V BOX WITH HO	T WATER COI	L.		•		•	

- VAV BOX SHALL BE ARI CERTIFIED AND BEAR THAT LABEL
- VAV BOX SHALL HAVE FACTORY MOUNTED MULTI-POINT RING OR CROSS FLOW SENSOR.
- PROVIDE MODULATING ELECTRONIC DDC HOT WATER VALVE. SEE SCHEDULE FOR FLOW ARRANGEMMENT (3 WAY OR 2 WAY).
- DUCT AND RADIATED NOISE LEVEL NOT TO EXCEED NC37 WITH 10DB ROOM EFFECT. DB BASED ON 10-12 WATTS.
- HEATING CAPACITY BASED ON 180°F ENTERING WATER TEMPERATURES AND 54°F ENTERING AIR TEMPERATURE. MAXIMUM COIL P.D. SHALL BE .01"WC (AIRFLOW P.D.).
- PRIMARY AIR VALVE CFM SHALL NOT EXCEED MANUFACTURER'S NOMINAL CFM OR 0.4" W.C. PRESSURE DROP. VELOCITY THROUGH VALVE SHALL NOT EXCEED 2300 FPM.
- SEE HOT WATER VAV BOX DETAIL.
- PROVIDE 1" THICK DUAL DENSITY FIBERGLASS LINING.
- PROVIDE 3/4" THICK FIBER FREE FOAM INSULATION.
- PROVIDE RIGHT OR LEFT HAND COIL CONNECTIONS AS SHOWN ON PLANS.
- PROVIDE CONTROL ENCLOSURE WITH FACTORY INSTALLED 24V CONTROL TRANSFORMER. PROVIDE RIGHT OR LEFT HAND CONTROL ENCLOSURE SIDE AS SHOWN ON PLANS.
- MANUFACTURER SHALL FACTORY MOUNT AND WIRE DDC CONTROLLER, ACTUCATOR, AND CONTROL TRANSFORMER AT EACH BOX. DDC CONTROLLER AND ACTUATORE SHALL BE FURNISHED BY SUCCESSFULL CONTROLS CONTRACTOR TO BOX MANUFACTURER. TRANSFORMERS SHALL BE PROVIDED BY VAV BOX MANUFACTURER.

SCHEDULE - PUMPS									
TAG	TACO MODEL NO.	GPM	APPROX. FT. HEAD	MOTOR RPM	MOTOR HP	SERVICE	BASIS OF DESIGN PUMP EFFICIENCY	NOTES	
HWP-1	KV1506D	52	39	1760	1.5	HOT WATER	63	1:2:3	
HWP-2	KV1506D	52	39	1760	1.5	HOT WATER	63	1:2:3	
					H ARII ITY TO S	FRVICE PLIMP WITHOUT DISTRIBUTI	NG PIPING CONNECTIONS SEE VE		

- DISTRIBUTING PIPING CONNECTIONS. SEE VERTICAL IN-LINE PUMP DETAIL. ALL SELF SENSING PUMPS WILL REQUIRE FACTORY STARTUP BY FACTORY TRAINED AND AUTHORIZED REPRESENTATIVE.

2 PUMP HEADS ARE APPROXIMATE AND SHALL BE RECALCULATED BY THE CONTRACTOR FROM DATA ON ALL ITEMS IN THE FLUID STREAM.

3 MANUFACTURER'S SHALL BE ALLOWED TO SUBMIT PUMPS WHOSE PUMP EFFICIENCY IS UP TO 5% BELOW THE BASIS OF DESIGN PUMP EFFICIENCY, ON PUMPS WITH MOTOR HP. EQUAL TO OR GREATER THAN 20 HP. ON PUMPS WITH MOTOR HP BELOW 20 HP, PUMP EFFICIENCY MAY BE UP TO 70% BELOW THE BASIS OF DESIGN.

								SCHE	DULE	- <b>ROOF</b>	IUP	UNI 1 2						
	TRANE	TOTAL COOLING	SENSIBLE COOLING	TOTAL	O A CEM	APPROX. E.S.P.	SUPPLY	RELIEF FAN HP	DELIEE CEM	MINUMUM STAGE		G ENTERING DITIONS	COOLING COND	LEAVING ITIONS	MINIMUM AMBIENT	HEATING	HEATING	NOTES
		MBH	MBH	SUPPLY CFM	O.A. CFIVI	(IN.W.G.)	FAN HP	& E.S.P.	COOLING HEATIN	E.A.T. D.B	E.A.T. W.B.	L.A.T. D.B. °F	L.A.T. D.B. °F	COOLING TEMP INPUT MBH	INPUT MBH	OUTPUT MBH	NOTES	
RTU-1	CD360B 4	341.16	274.38	11,000	913	2.0	10	2 FANS @ 1 HP EACH/0.1"	10,591	5 MOD 2.5	76.4	66.1	56.2	55.6	0	350	280	1:2:3:4:5:6:7:8:9:10:11:12:13: 14:15:16:17:18:19:20:21:22: 23:24:25:26

- 1. COOLING CAPACITIES BASED ON AIR ENTERING EVAPORATOR AT SCHEDULED CONDITION AND 95°F AMBIENT AIR TEMPERATURE. UNIT SHALL PROVIDE MECHANICAL COOLING DOWN TO SCHEDULED TEMPERATURE. UNIT SHALL UTILIZE R-410A REFRIGERANT.
- 2. HEATING CAPACITIES BASED ON 58.9°F AIR ENTERING HEAT EXCHANGER AND FIRING NATURAL GAS.
- 3. PROVIDE TRAPPED CONDENSATE DRAIN. SEE CONDENSATE DRAIN TRAP DETAIL.
- 4. UNIT SHALL HAVE BOTTOM DISCHARGE AND RETURN MOUNTED ATOP NEW VIBRATION ISOLATION ROOF CURB. ROOF CURB SHALL BE A MINIMUM OF 26" HIGH FROM HIGHEST LEVEL OF FINISHED ROOF
- 5. STATIC PRESSURE SCHEDULED DOES NOT INCLUDE WET COOLING COIL, FILTER, HEATING PLANT OR SYSTEM EFFECT LOSSES.
- 6. PROVIDE FACTORY NON FUSED DISCONNECT SWITCH WITH PREWIRED 15A CONVENIENCE OUTLET. PROVIDE PHASE MONITOR OPTION TO PROTECT AGAINST PHASE LOSS, PHASE IMBALANCE, AND PHASE REVERSAL(3 PHASE UNITS ONLY).
- PROVIDE FACTORY INSTALLED 'INSIDE THE CURB' UTILITY PROVISIONS (POWER CIRCUIT AND CONTROLS CIRCUIT) SO THAT NO ELECTRICAL UTILITIES ARE OUTSIDE UNIT CASING. GAS CONNECTION SHALL BE OUTSIDE CASING. POWER CIRCUIT AND CONTROL CIRCUIT SHALL ALL BE ROUTED UP INSIDE THE CURB. CONTRACTOR SHALL ROUTE UTILITIES IN FACTORY DESIGNATED LOCATION. UNDER NO CIRCUMSTANCES SHALL CONTRACTOR CUT OPENINGS IN BOTTOM OF RTAC UNIT. FIELD CUTTING OF RTAC UNIT SHALL RESULT IN REJECTION OF RTAC UNIT AND NEW UNIT SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
- 8. PROVIDE REFRIGERANT SERVICE VALVES.
- 9. PROVIDE MOTORIZED OUTDOOR AIR INTAKE HOOD WITH OUTSIDE AIR DAMPER AND BIRDSCREEN.
- PROVIDE FACTORY INSTALLED PACKAGED CONTROLS WITH BACNET COMMUNICATION TO BUIDLING AUTOMATION SYSTEM
- PROVIDE SINGLE DRY BULB TYPE OUTDOOR AIR ECONOMIZER AND INTAKE HOOD WITH ULTRA LOW LEAKAGE ECONOMIZER DAMPERS. INTAKE HOOD/ECONOMIZER SHALL BE DESIGNED FOR UP TO 100% OF SUPPLY CFM. PROVIDE INTEGRATED ECONOMIZER CONTROLS TO ALLOW SIMULTANEOUS ECONOMIZER/COMPRESSOR OPERATION. PROVIDE FACTORY MOUNTED AND PROGRAMMED "TRAQ" OUTDOOR AIRFLOW CONTROL MINIMUM VENTILATION RATE AND ALSO TO MONITOR OUTSIDE AIRFLOW RATE AT ALL TIMES. OUTDOOR AIR FLOW COMPENSATION AND DEMAND CONTROL VENTILATION SHALL BE DISABLED.
- 12. PROVIDE CONDENSER COIL HAIL GUARDS.
- 13. PROVIDE HINGED ACCESS DOORS.
- 14. PROVIDE 100% POWER EXHAUST W/ ULTRA LOW LEAK EXHAUST DAMPER AND STATITRAC PRESSURE CONTROL
- 15. PPROVIDE VAV SUPPLY AIR TEMPERATURE CONTROL W/ VARIABLE FREQUENCY DRIVE, BYPASS, AND MOTOR SHAFT GROUNDING RING.
- 16. PROVIDE 2" MERV 8 FILTERS.
- 17. PROVIDE BELT DRIVEN, FORWARD CURVED, CENTRIFUGAL SUPPLY FAN WITH FIXED SHEAVES. COMPLETE FAN ASSEMBLIES SHALL BE STATICALLY AND DYNAMICALLY BALANCED. FAN SHAFT SHALL BE MOUNTED ON GREASE MOTORS SHALL BE CIRCUIT BREAKER PROTECTED.
- 18. PROVIDE HIGH EFFICIENCY OPTION WITH CORROSION PROTECTED CONDENSER COIL
- 19. PROVIDE LOW HEAT OPTION STAINLESS STEEL HEAT EXCHANGER WITH MODULATING CONTROL
- 20. PROVIDE DIRTY FILTER DIFFERENTIAL PRESSURE SWITCH.
- 21 PROVIDE BACNET COMMUNICATION.
- 22 PROVIDE TOUCHSCREEN HUMAN INTERFACE (HMI).
- HIGH EFFICEINCY MODEL SHALL INCLUDE THE TRANE ESTAGE OPTION WHICH PROVIDES 3 COMPRESSORS STAGED TO DELIVER 5 STAGES OF COOLING CONTROL.
- 25 PROVIDE STAINLESS STEEL DRAIN PAN WITH CONDENSATE OVERFLOW SWITCH
- 26 PROVIDE FACTORY MOUNTED DISCHARGE AIR TEMPERATURE SENSOR.



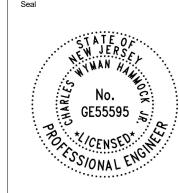
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Issued For Bid 10/28/2021.

Revisions By Date

MECHANICAL SCHEDULES

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DUCT MOUNTED SMOKE DETECTOR (PROVIDED AND WIRED BY ELEC.)  ESP (IN. W.G.)  FLOW SWITCH  FLOW SWITCH  FLOW METER  FLOW METER SUPPLY & RETURN PIPING	$\overline{}$	HUMIDISTAT OR HUMIDITY SENSOR	MBH	BTU's PER HOUR x 1000
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OA OVERRIDE TIMER  DIRECTION OF FLOW  UC UNDERCUT  S → HR → HOT WATER SUPPLY & RETURN PIPING  S → HLR → LOOP WATER SUPPLY & RETURN PIPING  S → HLR → LOOP WATER SUPPLY & RETURN PIPING  S → HLR → LOOP WATER SUPPLY & RETURN PIPING  S → HLR → LOOP WATER SUPPLY & RETURN PIPING  S → HLR → LOOP WATER SUPPLY & RETURN PIPING  CONDENSER WATER SUPPLY & RETURN PIPING  D → CONDENSATE DRAIN PIPING  D → CONDENSATE DRAIN PIPING  B = L, T.E.  BOTTOM ELEVATION - TOP ELEVATION  NIC NOT IN CONTRACT  R RELATIVE HUMBITY  R REFRIGERANT PIPING  NTS NOT TO SCALE  MU → MAKE-UP WATER PIPING  CF → CHEMICAL WATER TREATMENT PIPING  PRESSURE RELIEF PIPING  AUTOMATIC FLOW CONTROL VALVE  PIPE SLEEVE THROUGH WALL OR FLOOR - SEE PIPE SLEEVE DETAIL  DEMOLITION LEGEND  EXISTING EQUIPMENT, PIPING OR DUCTWORK TO REMAIN	FM	FLOW METER	RPM	REVOLUTIONS PER MINUTE (MOTOR SPEED)
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S — CR — CONDENSER WATER SUPPLY & RETURN PIPING  — D — CONDENSATE DRAIN PIPING  — V — VENT PIPING  — G — GAS PIPING  — REFRIGERANT PIPING  — NTS — NOT TO SCALE  — MU — MAKE-UP WATER PIPING  — CF — CHEMICAL WATER TREATMENT PIPING  — PRV — PRESSURE RELIEF PIPING  — AUTOMATIC FLOW CONTROL VALVE  — PIPE SLEEVE THROUGH WALL OR FLOOR - SEE PIPE SLEEVE DETAIL  — D — EXISTING EQUIPMENT, PIPING OR DUCTWORK TO REMAIN	-HS→ ⊢HR→	HOT WATER SUPPLY & RETURN PIPING	GPM	GALLONS PER MINUTE (WATERFLOW)
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DROPPING OR RISING PIPE  EXISTING EQUIPMENT, PIPING OR DUCTWORK TO REMAIN	<b>├</b>	AUTOMATIC FLOW CONTROL VALVE		DEMOLITION LECEND
	<u> </u>	PIPE SLEEVE THROUGH WALL OR FLOOR - SEE PIPE SLEEVE DETAIL		DEMOLITION LEGEND
PIPE TO OR FROM ABOVE	·	DROPPING OR RISING PIPE		EXISTING EQUIPMENT, PIPING OR DUCTWORK TO REMAIN
EXISTING EQUIPMENT, PIPING OR DUCTWORK TO BE REMOVED	$\longleftarrow$	PIPE TO OR FROM ABOVE		EXISTING EQUIPMENT, PIPING OR DUCTWORK TO BE REMOVED

### GENERAL NOTES

- THESE DRAWINGS AND MECHANICAL/HVAC DESIGN WERE GENERATED WITH 3-DIMENSIONAL BUILDING INFORMATION MODELING (BIM) SOFTWARE (REVIT). THE MODEL MAY BE AVAILABLE TO THE CONTRACTOR, AT THE DISCRETION OF THE PRIME PROFESSIONAL (ARCHITECT OR ENGINEER), FOR USE TO PRODUCE SHOP DRAWINGS, MATERIAL TAKE-OFFS, ETC. HOWEVER, THE CONTRACT DOCUMENTS ARE THESE 2-DIMENSIONAL DRAWINGS INCLUDED HEREIN. THE BIM MODEL IS NOT THE CONTRACT DOCUMENT(S) AND REQUESTS FOR INFORMATION. CHANGE ORDER REQUESTS, ETC. MAY NOT ORIGINATE FROM INCONSISTENCIES, CONFLICTS, ETC. IN THE BIM MODEL.
- SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR EXACT BUILDING ARRANGEMENT, DIMENSIONS AND DETAILS. THESE DRAWINGS ARE DIAGRAMMATIC, AND ARE NOT TO BE
- COORDINATE DUCT AND PIPE ROUTING AND EQUIPMENT LOCATION WITH PLUMBING AND ELECTRICAL INSTALLATIONS AND WITH BUILDING STRUCTURAL MEMBERS. OFF-SET DUCTS/PIPING AND SHIFT EQUIPMENT AS REQUIRED TO AVOID CONFLICTS WITH OTHER
- COORDINATE LOCATION OF CEILING REGISTERS WITH LIGHTING LAYOUT, SPRINKLER HEADS AND CEILING GRID SYSTEMS AND APPURTENANCES.
- DUCT SIZES INDICATED ON THE PLANS ARE CLEAR INSIDE DIMENSIONS REQUIRED. WHERE LINER IS INDICATED OR NOTED, INCREASE DUCT SIZE TO ACHIEVE INDICATED DIMENSION(S).
- REFER TO THE ELECTRICAL DRAWINGS FOR VOLTAGE, PHASE, MAXIMUM ALLOWABLE CURRENT DRAW, AMPERAGE AND CONNECTION ARRANGEMENT (SINGLE, MULTI-POINT, ETC.) OF ALL MECHANICAL EQUIPMENT PRIOR TO ORDERING/ISTALLING EQUIPMENT.
- SUPPORT ALL DUCTS, PIPING AND EQUIPMENT FROM PRIMARY BUILDING STRUCTURAL MEMBERS AND PROVIDE SUPPLEMENTAL STRUCTURAL FRAMING AS REQUIRED BETWEEN PRIMARY BUILDING STRUCTURAL MEMBERS TO SUPPORT ALL SYSTEMS INSIDE THE
- PROVIDE STRUCTURAL FRAMING AROUND FULL PERIMETER OF ALL ROOF OPENING/EQUIPMENT. PROVIDE STRUCTURAL LINTELS ABOVE ALL WALL OPENINGS. SEE STRUCTURAL FOR LINTEL DETAIL(S).
- PROVIDE PIPE SLEEVE THRU ALL WALLS AND THRU ALL FLOOR SLABS. SEE PIPE SLEEVE

BUILDING.

- PROVIDE PIPE HANGERS FOR ALL SUSPENDED PIPING AS SHOWN IN DETAILS. PROVIDE PIPE STAND FOR ALL FLOOR/GRADE MOUNTED PIPING AS SHOWN IN DETAILS.
- 11. INSTALL DUCT PENETRATIONS THROUGH NON-RATED WALLS AS SHOWN IN DETAILS.
- 12. CONTRACTOR SHALL SEE PHASING PLAN FOR INSTRUCTIONS ON WORK PHASING.



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Architect No. RA 015346 Architect No. 73872 -NCARB



Issued For Bid 10/28/2021.

Revisions By Date

Sheet Title
MECHANICAL SCHEDULES,
LEGEND & GENERAL NOTES

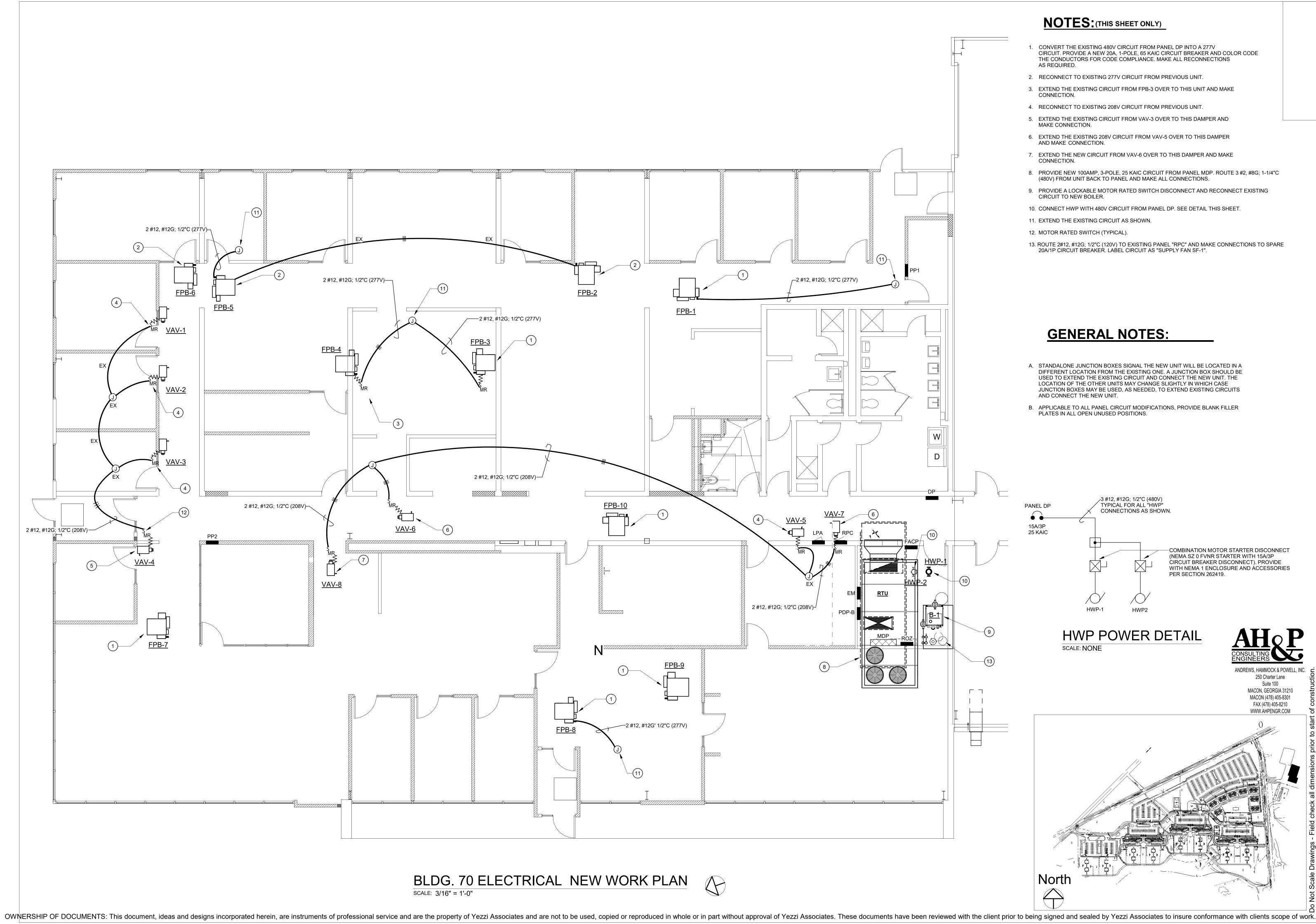
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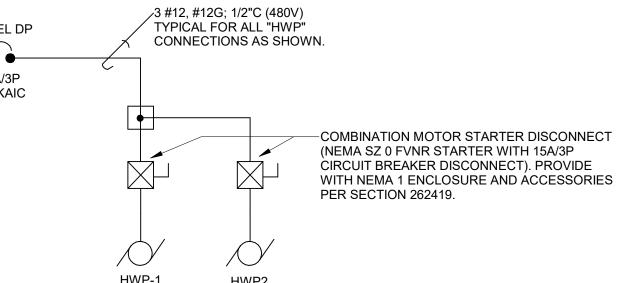


# NOTES: (THIS SHEET ONLY)

- 1. CONVERT THE EXISTING 480V CIRCUIT FROM PANEL DP INTO A 277V CIRCUIT. PROVIDE A NEW 20A, 1-POLE, 65 KAIC CIRCUIT BREAKER AND COLOR CODE THE CONDUCTORS FOR CODE COMPLIANCE. MAKE ALL RECONNECTIONS
- 2. RECONNECT TO EXISTING 277V CIRCUIT FROM PREVIOUS UNIT.
- 3. EXTEND THE EXISTING CIRCUIT FROM FPB-3 OVER TO THIS UNIT AND MAKE
- 4. RECONNECT TO EXISTING 208V CIRCUIT FROM PREVIOUS UNIT.
- 5. EXTEND THE EXISTING CIRCUIT FROM VAV-3 OVER TO THIS DAMPER AND MAKE CONNECTION.
- 6. EXTEND THE EXISTING 208V CIRCUIT FROM VAV-5 OVER TO THIS DAMPER AND MAKE CONNECTION.
- 7. EXTEND THE NEW CIRCUIT FROM VAV-6 OVER TO THIS DAMPER AND MAKE
- 8. PROVIDE NEW 100AMP, 3-POLE, 25 KAIC CIRCUIT FROM PANEL MDP. ROUTE 3 #2, #8G; 1-1/4"C (480V) FROM UNIT BACK TO PANEL AND MAKE ALL CONNECTIONS.
- 9. PROVIDE A LOCKABLE MOTOR RATED SWITCH DISCONNECT AND RECONNECT EXISTING
- CIRCUIT TO NEW BOILER.
- 11. EXTEND THE EXISTING CIRCUIT AS SHOWN.
- 12. MOTOR RATED SWITCH (TYPICAL).
- 13. ROUTE 2#12, #12G; 1/2"C (120V) TO EXISTING PANEL "RPC" AND MAKE CONNECTIONS TO SPARE 20A/1P CIRCUIT BREAKER. LABEL CIRCUIT AS "SUPPLY FAN SF-1".

# **GENERAL NOTES:**

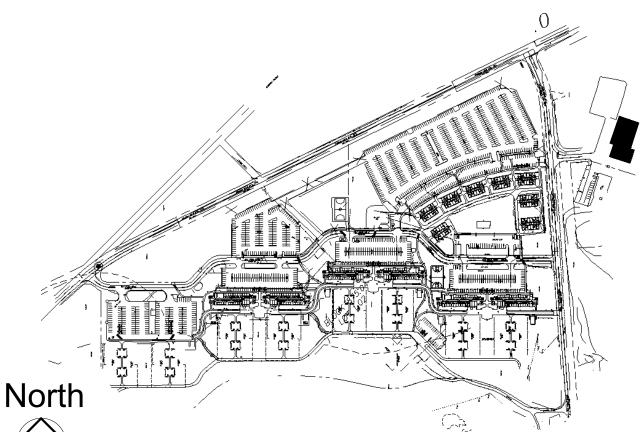
- A. STANDALONE JUNCTION BOXES SIGNAL THE NEW UNIT WILL BE LOCATED IN A DIFFERENT LOCATION FROM THE EXISTING ONE. A JUNCTION BOX SHOULD BE USED TO EXTEND THE EXISTING CIRCUIT AND CONNECT THE NEW UNIT. THE LOCATION OF THE OTHER UNITS MAY CHANGE SLIGHTLY IN WHICH CASE JUNCTION BOXES MAY BE USED, AS NEEDED, TO EXTEND EXISTING CIRCUITS AND CONNECT THE NEW UNIT.
- B. APPLICABLE TO ALL PANEL CIRCUIT MODIFICATIONS, PROVIDE BLANK FILLER PLATES IN ALL OPEN UNUSED POSITIONS.



HWP POWER DETAIL SCALE: NONE



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Sheet Title
BLDG. 70 ELECTRICAL NEW
WORK PLAN

YEZZI ASSOCIATES

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Planner No. 2368 Architect No. 019392

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-NCARB

ARCHITECTURE

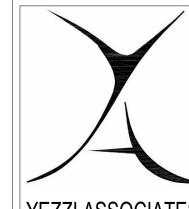
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# NOTES: (THIS SHEET ONLY)

- A. DISCONNECT THE EXISTING HEAT PUMP AND MAINTAIN THE 277V CIRCUIT CONNECTIONS TO PREPARE FOR THE NEW WORK.
- B. DISCONNECT THE EXISTING HEAT PUMP AND MAINTAIN THE CIRCUIT.
- C. DISCONNECT THE EXISTING HEAT PUMP AND REMOVE THE EXISTING CONNECTION TO THE OTHER HEAT PUMP. MAINTAIN THE CONNECTIONS TO PREPARE TO CONNECT TO A DIFFERENT UNIT AS SHOWN IN THE NEW
- D. DISCONNECT THE EXISTING HEAT PUMP AND MAINTAIN THE 208V CIRCUIT CONNECTIONS TO PREPARE FOR THE NEW WORK.
- E. DISCONNECT THE EXISTING HEAT PUMP AND MAINTAIN THE CONNECTIONS TO THE OTHER HEAT PUMPS. REMOVE THE CIRCUIT CONNECTING BACK TO SOURCE.
- F. DISCONNECT AND MAINTAIN EXISTING 120V CIRCUIT TO BOILER.
- G. DISCONNECT THE EXISTING HEAT PUMP AND REMOVE ALL CONNECTIONS TO OTHER HEAT PUMPS.
- H. DISCONNECT THE EXISTING HEAT PUMP AND REMOVE ALL CONNECTIONS INCLUDING THE CIRCUIT BACK TO SOURCE.
- I. DISCONNECT THE EXISTING HEAT PUMP AND REMOVE THE 480V CIRCUIT BACK TO SOURCE. PREPARE TO EXTEND THE CIRCUIT TO NEW FPB-1.
- J. DISCONNECT AND REMOVE EXISTING 480V CIRCUIT TO RTU.
- K. REMOVE ALL CONNECTIONS FROM THE WELL INCLUDING THE CIRCUIT BACK TO SOURCE.
- L. THE DEMOLITION AND REPLACEMENT OF THE MECHANICAL ROOM CEILING IS CALLED FOR ELSEWHERE IN THIS CONTRACT. THE ELECTRICAL CONTRACTOR SHALL COORDINATE THE REMOVAL, RELOCATION, AND REPLACEMENT OF LIGHTING, EXPOSED CIRCUITS, FIRE ALARM AND OTHER AS MAY EXIST. THIS WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF



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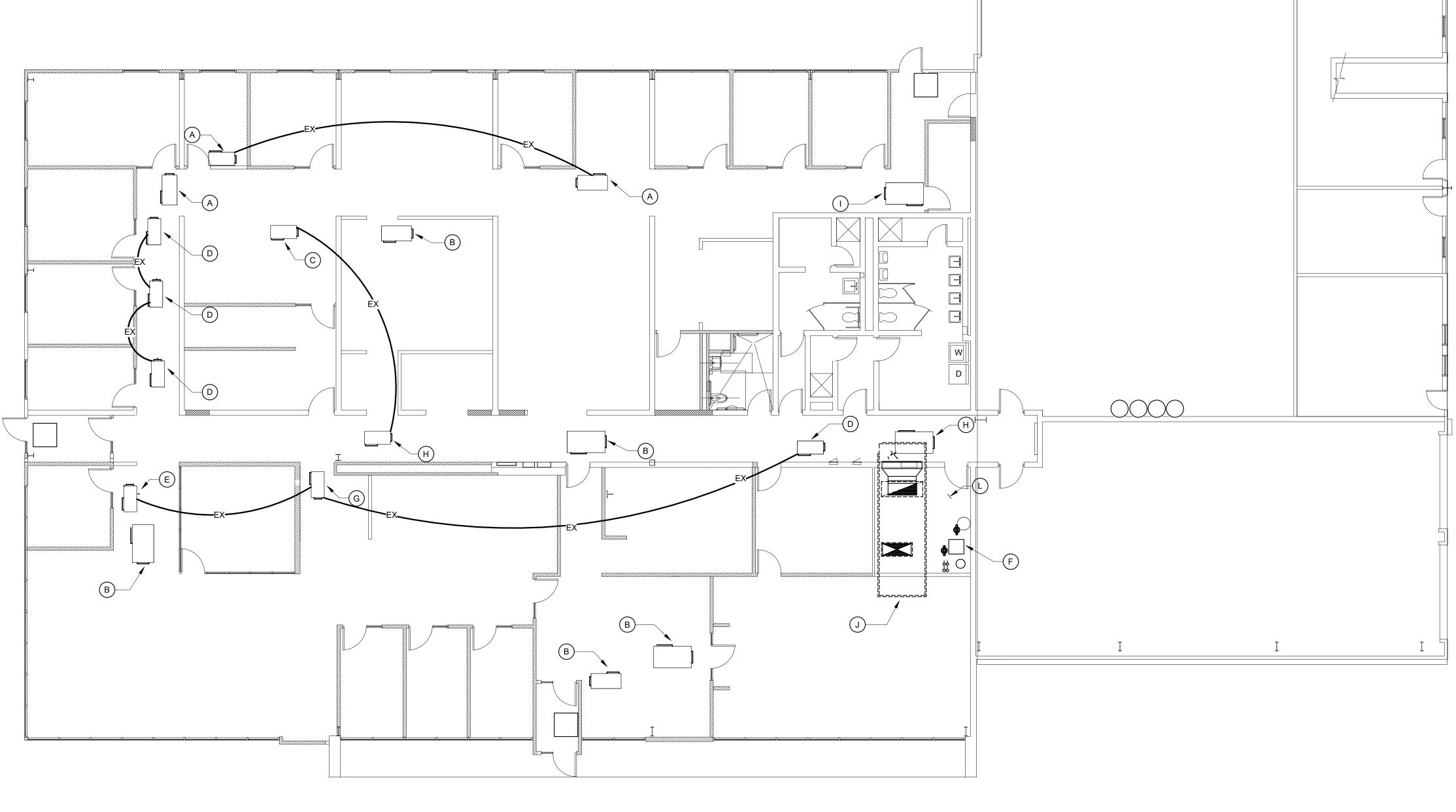


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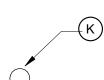


BLDG. 70 ELECTRICAL DEMO PLAN

SCALE: 1/8" = 1'-0"



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RE: Addendum #1

Project Title: IFB 22-20 HVAC Renovations: Building 70

Issued Date: **December 9, 2021** 

#	Item	Description
1	Questions & Answers	Questions & Answers have been posted as part of this Addendum.
2	Information & Clarifications	Additional project information has been included as part of this Addendum.

The information contained herein clarifies, revises, supplements and/or supersedes the specific parts of the documents referred to and shall be attached to and become part of those documents as if originally forming a part thereof. Except herein as modified, all other provisions of the documents shall remain in full force and, unless otherwise described in this Addendum, shall comply with the requirements originally specified. All other conditions of this project will remain in effect.

- Office of Procurement & Contracting: https://stockton.edu/procurement-contracting/index.html
- Please direct any questions to: <a href="mailto:RFP-Purchasing@stockton.edu">RFP-Purchasing@stockton.edu</a>

#### ADDENDUM ACKNOWLEDGEMENT

I acknowledge that I have received and reviewed this Addendum

Company Name (please print)
company manus (presses print)
Name (please print)
· · · · · · · · · · · · · · · · · · ·
Signature
Date

THIS ACKNOWLEDGEMENT PAGE MUST BE INCLUDED WITH SUBMISSION OR BID WILL BE REJECTED.



#### **Questions & Answers**

	1	Question & Answer					
Please advise if a five-million-dollar Umbrella Policy is acceptable							
No.							

2 Question & Answer

Are Trane VAV boxes acceptable to bid?

Yes, Trane VAV boxes are acceptable. Specification section 23 36 00 2.1 B has been revised per this Addendum to include Trane as a specified manufacturer.

3 Question & Answer

Are AERCO Boilers acceptable to bid?

Yes, AERCO Boilers are acceptable, provided they meet all requirements of the specification. Specification section 23 52 30 2.1 F has been revised per this Addendum to include AERCO as a manufacturer.

If you submitted questions to <u>RFP-Purchasing@stockton.edu</u> by the due date indicated in the project document, but they were not received and answered here, please contact:

Robert Yufer Office of Procurement & Contracting Robert.Yufer@stockton.edu 609.652.4698



#### **Additional Information & Clarifications**

- 1) In Specification Section 23 05 13 Common Requirements for HVAC Equipment page 1, delete section 1.3 B and substitute the following verbiage, "Contractor shall cover and protect with minimum 8 mil plastic sheeting and duct tape all desks, and computers from dirt and damage. Contractor will be required to clean all surfaces periodically and deep cleaned after completion of construction."
- 2) In specification section 23 05 13 Common Requirements for HVAC Equipment page 6 section 1.7, add paragraph E. and the following verbiage: "The goal of the sequencing and phasing plan is to ensure the building indoor environment does not exceed minimum and maximum values to protect from freezing and or mold/mildew growth during the HVAC renovation. The contractor shall be responsible for creating a custom sequencing and phasing plan during the construction period based on equipment lead times and projected demolition/construction progress so as to ensure the building temperature is maintained between 50° F and 80° F and the relative humidity shall be kept below 60%. The building will be approximately 25% occupied during construction, but at no time will the Owner allow occupancy of the building to slow the contractor's work progress."
- 3) In specification section 23 36 00 Air Terminal Units page 2 Section 2.1 B, add Trane as an approved manufacturer for the terminal units.
- 4) In specification section 23 52 30 Condensing Boilers page 4 Section 2.1 F, add AERCO as a manufacturer for the condensing boiler.
- 5) On Sheet MD-B70-201, delete note 5 and replace note 5 with the following verbiage. "EXISTING GEOTHERMAL WELL SHALL BE ABANDONED AND PLUGGED IN ACCORDANCE WITH N.J.A.C. 7:9D WELL CONSTRUCTION AND MAINTENANCE; SEALING OF ABANDONED WELLS. THE DOCUMENT CAN BE LOCATED AT THIS LINK <a href="https://www.nj.gov/dep/rules/rules/njac7">https://www.nj.gov/dep/rules/rules/njac7</a> 9d.pdf. ALL WELL ABANDONMENT WORK SHALL BE PERFORMED BY A NEW JERSEY LICENSED WATER WELL DRILLER. A DECOMMISSIONING PLAN SHALL BE SUBMITTED TO THE DEPARTMENT PURSUANT TO N.J.A.C. 7:9D-1.17 PRIOR TO DECOMMISSIONING THE WELL IF REQUIRED. EXISTING GEOTHERMAL WELL SHALL BE DECOMMISSIONED BY FILLING THE WELL WITH EITHER BENTONITE-BASED THERMALLY ENHANCED GROUT OR A CEMENT BASED GROUT BASED ON THE pH AND TOTAL DISSOLVED SOLIDS OF THE GROUNDWATER AND WHETHER THE GROUT EXTENDS THROUGH ZONES OF SALTWATER. AFTER SEALING THE WELL TO THE SURFACE WITH GROUT OR CEMENT, THE CASING SHALL BE CUT BELOW GRADE AND A CONCRETE SLAB SHALL BE POURED OVER THE TOP OF THE ABANDONED WELL. THE DIMENSIONS OF THE CONCRETE SLAB SHALL BE A MINIMUM OF 6" THICK AND SHALL BE A MINIMUM OF 5' LONG BY 5' WIDE. THE CONCRETE MIX FOR THE SLAB SHALL BE A MINIMUM STRENGTH OF 3000 PSI AND SHALL BE REINFORCED WITH MINIMUM 10 GAUGE 6" X 6" WELDED WIRE MESH."

### Office of Procurement & Contracting Addendum & Acknowledgement



- 6) On Sheet MD-B70-201, delete note 11 and replace note 11 with the following verbiage. "EXISTING GEOTHERMAL WELL SHALL BE ABANDONED AND PLUGGED IN ACCORDANCE WITH N.J.A.C. 7:9D WELL CONSTRUCTION AND MAINTENANCE; SEALING OF ABANDONED WELLS. THE DOCUMENT CAN BE LOCATED AT THIS LINK <a href="https://www.nj.gov/dep/rules/rules/njac7">https://www.nj.gov/dep/rules/rules/njac7</a> 9d.pdf. ALL WELL ABANDONMENT WORK SHALL BE PERFORMED BY A NEW JERSEY LICENSED WATER WELL DRILLER. A DECOMMISSIONING PLAN SHALL BE SUBMITTED TO THE DEPARTMENT PURSUANT TO N.J.A.C. 7:9D-1.17 PRIOR TO DECOMMISSIONING THE WELL IF REQUIRED. EXISTING GEOTHERMAL WELL SHALL BE DECOMMISSIONED BY FILLING THE WELL WITH EITHER BENTONITE-BASED THERMALLY ENHANCED GROUT OR A CEMENT BASED GROUT BASED ON THE pH AND TOTAL DISSOLVED SOLIDS OF THE GROUNDWATER AND WHETHER THE GROUT EXTENDS THROUGH ZONES OF SALTWATER. AFTER SEALING THE WELL TO THE SURFACE WITH GROUT OR CEMENT, THE CASING SHALL BE CUT BELOW GRADE AND A CONCRETE SLAB SHALL BE POURED OVER THE TOP OF THE ABANDONED WELL. THE DIMENSIONS OF THE CONCRETE SLAB SHALL BE A MINIMUM OF 6" THICK AND SHALL BE A MINIMUM OF 5' LONG BY 5' WIDE. THE CONCRETE MIX FOR THE SLAB SHALL BE A MINIMUM STRENGTH OF 3000 PSI AND SHALL BE REINFORCED WITH MINIMUM 10 GAUGE 6" X 6" WELDED WIRE MESH."
- 7) On sheet M-B70-501, the VAV box schedule second column from the left states "TITUS MODEL NO". Replace the word "TITUS" with "PRICE".
- 8) On Sheet S-B70-301, delete note 6 and replace note 6 with the following verbiage. "The general contractor / construction manager shall verify that flashing details are in accordance with roofing manufacturer's requirements to preclude voiding of any roofing warranties."

### **STOCKTON UNIVERSITY**



# GENERAL CONDITIONS FOR CONSTRUCTION

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#### **GENERAL CONDITIONS**

#### 1. ARTICLE 1 -- CONTRACT DOCUMENTS

- **1.1 Definitions** for the purpose of this Contract:
  - 1.1.2 <u>A/E</u>: The Architectural or the Engineering (A/E) consultant engaged by SU to act as the authorized representative of the contracting officer.
  - 1.1.3 Where "as shown," "as indicated," "as detailed," or words of similar import are used, it shall be understood that the reference is made to the Drawings accompanying this Contract unless stated otherwise.

    The word "provided" as used herein shall be understood to mean "provided complete in place," that is, "furnished and installed."
  - **1.1.4** Addendum: A document, issued by SU prior to opening of bids, which supplements, revises or modifies the solicitation document(s) furnished for bidding purposes.
  - 1.1.5 <u>Claims:</u> Differences between SU and a Contractor concerning extra Work, alleged errors or omissions in the Specifications or Drawings, unreasonable delays, damages to Work, informal suspensions or interference by SU personnel, and like matters.
  - Change Order Request: A request for equitable adjustment made by the Contractor in response to written direction by the Associate Vice President for Operations or his authorized representative(s) pursuant to Article 14 entitled "Changes to Contract."
  - 1.1.7 <u>Change In Work:</u> Changes to the original design, Specifications, or Scope of Work as required by the SU, prior to agreement on adjustment, if any, in the Contract Sum or Contract time, or both.
  - Contract Documents: Consists of the Contract between SU and Contractor; General and Supplementary Conditions to the Contract, Plans, Drawings, Specifications, Addenda issued prior to execution of the Contract, or other documents listed in the Contract which are attached hereto or incorporated herein by reference, and Modifications to the Contract issued after execution of the Contract. A Modification is: (i) a written amendment to the Contract signed by both parties, (ii) a Change Order, (iii) a Construction Change directive or (iv) a written order for minor change to the Work issued by the A/E, together with any such plans, drawings, specifications, schedules, or other documents which may be

produced pursuant to or derived from this Contract and which are intended to bind the Contractor hereunder.

- 1.1.19 <u>Contract Limit Lines</u>: Refers to those lines shown on the contract drawings which limit the boundaries of the project, and beyond which no construction Work or activities shall be performed by the Contractor unless otherwise noted on the drawings or specifications.
- 1.1.10 <u>Contractor:</u> The person or persons, partnership or corporation named as Contractor in this Contract, operating as an independent Contractor and not as an agent of the SU in the performance of its functions. Whether referred to as "Contractor," "prime Contractor," "prime," "separate Contractor," or "single Contractor," it shall be understood to mean Contractor. It does not include suppliers or material men.
- 1.1.11 Costs: Costs shall mean: (i) the cost of labor for construction workers directly employed by the Contractor to perform construction of the Work; (ii) costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed; (iii) rental costs of machinery and equipment, exclusive of hand tools, whether rented from Contractor or others; and (iv) payment made to subcontractors in accordance with the requirements of the subcontract. The costs of supervision and field office personnel, specifically including superintendents and labor foreman, are only considered to be part of the Overhead calculation for the purpose of computing an equitable adjustment under Article 14.
- 1.1.12 <u>Department</u>: As used in this Contract shall mean the Facilities Planning and Construction Department of SU.
- Associate Vice President for Facilities & Construction: means the Associate Vice President for Facilities & Construction or his designated representative(s) who is authorized to administer the design, engineering and construction of all SU buildings and facilities. The Associate Vice President for Facilities & Construction is the delegated officer representing SU personally or through authorized representatives in all relationships with Contractors, consultants and A/E's. This includes a duly appointed successor or an authorized administrative contracting officer acting within the limits of his or her authority.

The Associate Vice President for Facilities & Construction is the interpreter of the conditions of the Contract and the judge of its performance. The Associate Vice President for Facilities & Construction shall not take arbitrary positions benefiting either

- SU or the Contractor, but shall use the powers specified under the contract to enforce its faithful performance by both.
- 1.1.14 <u>Drawings</u>: Shall mean the graphic and pictorial portions of the Contract Documents, showing design, location and dimensions of the Work, generally including any plans, elevations, sections, details, schedules and contemplated by this Contract.
- **1.1.15** <u>Final Completion:</u> The point in time when SU determines the Work is complete.
- 1.1.16 Notice: A written directive or communication served on the Contractor to act or perform Work or carry out some other contractual obligation. It shall be deemed to have been duly served if delivered to an individual or member of the firm or entity or to an officer of the corporation for whom it was intended. This includes delivery by courier or registered or certified mail to the business address cited in the Contract Documents.
- **1.1.17** Owner means Stockton University.
- **1.1.18** Project: A general term for identification of the total construction of the Work performed under the Contract. It includes the Work and all administrative aspects required to fully satisfy the contract requirements.
- **1.1.19** <u>Public Contract</u>: Any contract or agreement entered into by Stockton University or any instrumentality of SU to purchase goods, services, or both.
- **1.1.20** <u>SU</u>: The abbreviation for Stockton University.
- 1.1.21 <u>Site, Construction Site or Project Site refers</u> to the geographical area of the entire SU facility or property at which the Work under the contract is to be performed.
- 1.1.22 <u>Specifications</u>: All written requirements for materials, equipment, systems, standards and Workmanship of the Work, and instructions or other documents in or pursuant to this Contract pertaining to the method of performing the Work and the results to be obtained.
- 1.1.23 Wherever in the Specifications or upon the Drawings the words "directed," "required," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the

"direction," "requirement," "order," "designation," or "prescription" of the Associate Vice President for Operations is intended. Similarly, the words "approved," "acceptable," "satisfactory," or words of like import shall mean "approved by," or "acceptable to," or "satisfactory to" the Associate Vice President for Operations unless otherwise expressly stated.

- 1.1.24 <u>Subcontractor</u>: The person or persons, partnership, or corporation that enters into a contract with the Contractor for the performance of Work under this Contract, or the subcontractors of any tier of such individual or corporation.
- 1.1.25 <u>Substantial Completion</u>: The date the building or facility is operational or capable of serving its intended use even though all permanent installations are not in place. The determination as to the date of substantial completion shall be made pursuant to Article 8.3 of these General Conditions.
- 1.1.26 <u>Summary of Work</u>: a description of the scope of work to be performed by the Contractor and included in the project Specifications as part of the Contract Documents.
- **1.1.27** Systems Assurance: The totality of all quality control and assurance requirements specified in the Contract Documents.
- 1.1.28 <u>Unit Schedule Breakdown</u>: A detailed list of the Work activities required for project construction, other elements associated with fulfilling the requirements of the contract (bonds, insurance, etc.), major items of material or equipment, and the prices associated with them.
- 1.1.29 <u>Work</u>: All efforts as are required by the Contractor as they relate to the Contract Documents, including but not limited to, management, supervision, labor, material and equipment as are necessary to fulfill the Contractor's obligations under this agreement.

#### 1.2 Intent of the Contract

1.2.1 The Drawings and Specifications of the Contract are intended to require the Contractor to provide for everything reasonably necessary to accomplish the proper and complete finishing of the Work. All Work and materials included in the Specifications and not shown on the Drawings, or shown on the Drawings and not in the Specifications, shall be performed and/or furnished by the Contractor as if described in both. Any incidental materials and/or Work not specified in the Drawings and/or the Specifications which is, nevertheless, necessary for the true

development thereof and reasonably inferable there from, the Contractor shall understand the same to be implied and required, and shall perform all such Work and furnish all such materials as if particularly delineated or described therein. Should there be an obvious error or omission in the Drawings or Specifications, it shall be the Contractor's responsibility to complete the Work as reasonably required, consistent with the intent of such Drawings and Specifications as may be interpreted by SU.

1.2.2 Each Contractor shall abide by and comply with the true intent and meaning of the Drawings, the Specifications and other Contract Documents taken as a whole, and shall not avail itself of any omission or discrepancy appear or should any doubt exist, or any dispute arise as to the true intent and meaning of the Drawings, Specifications or other Contract Documents, or should any portion thereof be obscure, or capable of more than one interpretation, the Contractor shall immediately notify the A/E and seek correction or interpretation thereof prior to commencement of affected Work. The A/E shall issue a written interpretation with reasonable promptness. However, the Contractor shall make no claim against SU for expenses incurred or damages sustained on account of any error, discrepancy, omission, or conflict in the Contract Documents unless and only to the extent that the Contractor has submitted a written request for interpretation, clarification, or correction to the A/E and SU, and such written request has been received by the A/E and SU at least seven (7) working days prior to the date fixed for the opening of bids.

In addition, such claim shall only be recognized by SU if the matter raised by the written request has not been addressed by SU through the issuance of an addendum interpreting, clarifying, and/or correcting such error, discrepancy, omission or conflict. In case of dispute, the matter shall be referred to SU for a decision.

- 1.2.3 Each and every provision required by law to be inserted in the Contract Documents shall be deemed to have been inserted therein. If any such provision has been omitted or has not been correctly inserted, then upon application of either party, the contract shall be physically amended to provide for such insertion or correction.
- 1.2.4 The organization of the specifications into divisions, sections and articles, and the arrangement of Drawings shall not be construed by the Contractor as being intended to divide or allocate the Work among subcontractors in any manner or to establish the extent of the Work to be performed by any trade.

- 1.2.5 Unless otherwise provided in the Contract Documents, SU will furnish to the Contractor Drawings and Specifications, and additional instructions by means of supplemental Drawings as otherwise necessary for the proper execution of the Work at the Contractor's expense.
- 1.2.6 The Contractor shall do no Work without proper drawings and instructions, unless written authorization to proceed from the Associate Vice President for Operations is received by the Contractor. In giving such additional instructions, SU may make minor changes in the Work, not involving extra cost.
- 1.2.7 All drawings referred to, and any supplementary details as may be furnished and approved from time to time as the Work progresses, are understood as being included as part of the Contract.
- **1.2.8** The sequence of precedence pertaining to interpretation of Contract Documents is as follows:
  - a. Executed Contract
  - b. Addenda/Bulletins/Instructions/Proposal Form
  - c. Supplemental General Conditions
  - d. Specifications, including General Conditions
  - e. Drawings, in the following order of precedence:
    - (1) Notes on Drawings
    - (2) Large scale details
    - (3) Figured dimensions
    - (4) Scaled dimensions

Where there may be a conflict in the Specifications or Drawings not resolvable by application of the provisions of this paragraph, then the more expensive labor, materials, or equipment shall be assumed to be required and shall be provided by the Contractor.

1.2.9 On all Work involving alterations, remodeling, repairs or installation within existing buildings, it shall be the responsibility of the Contractor, by personal inspection of the existing building, facility, plant or utility system, to ascertain the accuracy of any information given which may affect the quantity, size and/or quality of materials required for a satisfactorily completed contract, whether or not such information is indicated on the Drawings or included in the Specifications. The Contractor shall include the costs of all material and labor required to complete the Work based on reasonably observable conditions.

#### 2. ARTICLE 2 – OWNER

#### 2.1 SU's Right to Stop Work

2.1.1 If the Contractor fails to correct defective Work or persistently fails to carry out the Work in accordance with the Contract Documents, SU's authorized representative may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated. Stoppage of the Work of one or more Contractors, however, shall not render SU liable for claims of any kind, including delays sustained by one Contractor as the result of the stoppage of the Work of another Contractor.

# 2.2 SU's Right to Terminate

- 2.2.1 If the Contractor persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly the orderly progress of the Work in accordance with the approved schedule; if the Contractor fails to make prompt payment to subcontractors or for materials or labor; or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction; or if the Contractor or any of its subcontractors is guilty of a substantial violation of a provision of the Contract Documents or otherwise defaults or neglects to carry out the Work in accordance with the Contract Documents or directives from SU, then SU may, without prejudice to any right or remedy, and after giving the Contractor and its surety three Working days written notice to forthwith commence and continue correction of such default or neglect with diligence and promptness. terminate the employment of the Contractor by the issuance of a written notice to that effect to the Contractor and its surety should both or either of them fail to comply with the demands of the original above mentioned three day notice.
- 2.2.2 Upon such termination, SU may take possession of the site and of all the materials, equipment, and tools on the site, and may finish the Work by whatever method SU may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the Work is finished. The person or firm designated to carry out such Work will be paid as authorized by SU, without entailing any personal liability upon the officers of SU issuing certificates or making such payments.
- 2.2.3 If the unpaid balance of the contract sum exceeds the cost of finishing the Work (including liquidated damages for delays and all consequential damages sustained by SU originating from such breach of contract), such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor and/or its surety shall pay the difference to SU, and this obligation shall survive the termination of the contract.

- 2.2.4 If, within three (3) Working days following receipt of Notice of Termination by the Contractor's surety (the issuer of the performance and payment bonds), the said surety exercises its right to take over the Work and expeditiously commences to prosecute the same to completion, SU shall permit the surety to do so under the following terms and conditions:
  - a. Evidence of the surety's intention to take over and complete the Contract shall be in writing over the signature of an authorized representative and served upon SU within three (3) Working days after receipt by the surety of the Notice of Termination.
  - b. The execution of a written agreement between SU and the surety, whereby the latter undertakes and assumes the obligation to complete the balance of the Work of its defaulting Contractor in accordance with the terms and conditions of the Contract between SU and Contractor agreement, is to be performed by a substituted Contractor satisfactory to SU at the surety's sole cost and expense. Provision for payments to the surety or to the substituted Contractor of unpaid contract balances, if any, then in the hands of SU.
  - c. The agreement between SU and the surety shall also expressly provide that the surety shall not be relieved from any of its obligations under the performance and payment bonds.
  - d. All current obligations for labor and materials incurred and outstanding by the defaulting Contractor on this Project shall be paid without delay, subject to allowance of reasonable time to verify such claims by the surety.
  - e. The parties expressly understand and agree that this agreement is without prejudice and is subject to such rights and remedies as either party (including the Contractor) may elect to assert after final completion and acceptance of the Work.

#### 2.3 Owner's Representation

2.3.1 SU will be represented on the construction site by architects, engineers and project inspectors or other designated representatives. This technical staff may conduct on-site inspections, maintain logs of construction progress and problems encountered, review and process Contractor's invoices including stored materials on site, attend job meetings, serve as liaison between the A/E and Contractors, prepare and submit reports on special problems associated with the job, evaluate and process Change Orders, and

generally remain fully cognizant and informed by the Contractor of every aspect of ongoing construction. The Owner's representatives have only those duties which are required of an owner; responsibility for completion of this Project, pursuant to the Contract Documents, remains that of the Contractor(s).

#### 2.4 Review of Contractor Claims and Disputes

2.4.1 Upon presentation by the Contractor of a request in writing, the Owner may review any decision or determination of SU representative or the A/E as to any claim, dispute or any other matter in question relating to the execution or progress of the Work or the interpretation of the Contract Documents.

Consistent with the intent of this Contract, the Owner may schedule a conference for the purpose of settling or resolving such claims, disputes or other matters. Where such a conference is conducted, the Contractor shall be afforded the opportunity to be heard on the matter in question.

Following review of the Contractor's request, SU and the Contractor may settle or resolve the disputed matter, provided however that any such settlement or resolution shall be subject to all requirements imposed by law, including where applicable, the New Jersey Contractual Liability Act (NJSA 59:13-1 *et seq.*).

- **2.4.2** The following is the Claim and Dispute process. This process assumes continued disagreement at each step. Agreement can be reached at any point in this process.
  - 1. Contractor issues a Request for Change Order to the designated SU representative & A/E in accordance with the terms and timing stated in Article 14 CHANGES IN THE WORK
  - 2. SU authorized representative issues preliminary response rejecting the claim in whole or in part within 10 days
  - 3. Contractor notifies SU representative & A/E that the initial claim still stands within 10 days
  - 4. A/E issues the Architect's final determination within 10 days
  - 5. Contractor notifies the authorized SU representative & A/E that the initial claim still stands within 10 days
  - 6. SU issues the final determination which is binding but subject to appeal in Appellate Court venue in Atlantic County, State of New Jersey.

# 2.5 Termination By The Owner For Convenience

- 2.5.1 The Owner may, at any time, terminate the Contract in whole or in any part for SU's convenience and without cause when the Owner in his/her sole discretion views termination is in the public interest.
- 2.5.2 Upon receipt of an order of Termination for Convenience, the Contractor shall not proceed with any item of Work, which is not specified in the Order of Termination. The Contractor shall complete all items of Work specified in the Termination order. Such Work shall include punch list items and all Work necessary to ensure the safety of the public, to properly secure existing Work already constructed or partially constructed and to secure the Project site.

This Work so ordered shall be performed in accordance with the Contract Documents, and may include items of Work not in the original Contract. The Contract shall be considered substantially complete upon completion and acceptance of all items of Work specified in the Order, except punch list items. After completion of the punch list items and all documents required by the Contract, the Contract shall terminate upon issuance of a Final Certificate and Payment. The Owner reserves the right to declare in default a Contractor whom fails to carry out the conditions set forth in an Order of Termination for Convenience.

When SU orders termination of the Contract for Convenience, all completed items of Work as of that date will be paid for at the Contract price. Payment for partially completed Work will be paid for at agreed prices. Items which are eliminated in their entirety by such termination will be paid for only to the extent provided in Paragraph 2.5.3. Payment for new items, if any, will be made either at agreed prices or in accordance with Article 14.

Materials obtained by the Contractor for the Work but which have not been incorporated therein may, at the option of SU, be purchased from the Contractor at actual cost delivered to a prescribed location, or otherwise disposed of as mutually agreed.

Within 60 days of the effective termination date, the Contractor shall submit claims for additional costs actually incurred, not covered above or elsewhere in the Contract. Such claims may include such cost items as reasonable mobilization efforts, overhead expenses attributable to the Work performed, and subcontractor costs not otherwise paid for, actual idle labor cost if Work is stopped in advance of the termination date. Costs, which are prohibited under

provisions of the Contract and anticipated profits on Work not performed, are not allowed.

2.5.3 If acceptable material is ordered by the Contractor for the eliminated item prior to the date of notification of such elimination and if orders for such material cannot be canceled, it will be paid for at the actual cost to the Contractor. In such case, the material paid for becomes the property of SU and the actual cost of any further handling will be paid for. If the material is returnable to the vendor and if SU so directs the material shall be returned and the Contractor will be paid for the actual cost or charges made by the vendor for returning the material. The actual costs of handling returned material will be paid.

The actual costs or charges will be computed in the same manner as if the Work were to be paid for as provided in the Contract. However, no profit will be allowed.

# **2.5.4** Post Termination Obligations

- 1. Cancel, or if so directed by the SU, transfer to SU all or any of the commitments and agreements made by Contractor relating to the Project, to the extent same are cancelable or transferable by Contractor.
- 2. Transfer to SU the manner, to the extent, and at the time directed by SU, all supplies, materials, and other property produced as a part of, or acquired in the performance of, Contractor's services in connection with the Project; and
- 3. Take such other actions as SU may reasonably direct.

# **2.5.5** Ownership of Documents

All reports, analyses, data, Drawings, opinions and other material (collectively the "Documents") prepared and furnished by the Contractor under or for the Project shall be the property of SU whether the Project is completed or not, and shall be delivered to the SU on the earlier of (1) the Substantial Completion Date, or (2) the date of termination of this Agreement for any reason prior to Final Completion of the Project. If the Agreement is terminated for any reason prior to Final Completion of the Project, the Documents may be used by SU and its agents, employees, representatives and assigns, in whole or in part, or in modified form, for all purposes the SU may deem advisable in connection with completion and maintenance of and additions to the Project, without further employment of, or payment of any compensation to the Contractor.

#### 3. ARTICLE 3 -- A/E

#### 3.1 The A/E

3.1.1 When SU provides full supervision and management of a project, the A/E's role is that of consultant to SU.

#### 3.2 Administration of the Contract

- **3.2.1** The A/E will provide a certain portion of the administration of the contract as hereinafter described.
- 3.2.2 The A/E will monitor the execution and progress of the Work and will immediately notify the Owner of any related problems. The A/E will at all times be provided access to the Work. The Contractor shall provide facilities for such access so as to enable the A/E to perform its functions under the Contract Documents.
- 3.2.3 The A/E will not be responsible for, nor has control or charge of, construction means, methods, techniques, sequences of procedures, or safety precautions and programs in connection with the Work. The A/E will not be responsible for, nor has control or charge of, the acts or omissions of the Contractors, subcontractors, or any of their agents or employees, or any other person performing any of the Work, but shall have the obligation to immediately inform the Owner of any inadequate performance of the project.
- 3.2.4 The A/E has the authority to recommend rejection of Work which it believes does not conform to the Contract Documents. Whenever the A/E considers it necessary or advisable, it may request the Owner to provide special inspection or testing of the Work, whether or not such Work has been fabricated, installed or completed.
- 3.2.5 The A/E will review, approve or take other appropriate action relating to Contractors' submittals, such as shop Drawings, product data and samples, to assure conformance with the design requirements and the Drawings and Specifications of the Work. Such actions shall be taken with reasonable promptness. Approval of a specific item shall not indicate approval of an assembly of which the item is a component.
- 3.2.6 The A/E will periodically review the Contractors' as-built Drawings to ensure that they are up to date.

#### 3.3 Inspections - Substantial and Final Completion

**3.3.1** The A/E, accompanied by the Contractor and the Owner's authorized representative, will conduct site inspections to determine the dates of Substantial and Final Completion and will receive and

compile written warranties and all other requisite documents assembled and supplied by the Contractor. The A/E will forward these documents to the Owner for review and certify final contract acceptance.

#### 3.4 Punch List Coordination

3.4.1 The Owner's authorized representative shall coordinate and conduct a project inspection for the development of a comprehensive punch list. The punch list participants will include the Contractor, A/E and the Owner's authorized representative.

#### 4. ARTICLE 4 – THE CONTRACTOR

The Contractor shall perform the Work in accordance with the Contract Documents. This shall include, but not be limited to, the following requirements:

#### 4.1 Review of Contract

- 4.1.1 The Contractor has the duty to do the following: to thoroughly examine and become familiar with all the Contract Documents, including but not limited to the complete set of Drawings Specifications of the entire Project; to note cases where it is specified that certain work or materials or both are to be omitted by one Contractor and to be furnished or installed by another; to carefully examine the site; to investigate and accurately determine the nature and location of the Work, the current equipment, labor and material conditions, and all matters which may in any way affect the Work or its performance. The Contractor is responsible to check and verify reasonably observable conditions outside the Contract Limit Lines to determine whether any conflict exists with the Work the Contractor is required to perform under the Contract. This includes a check on elevations, utility connections and other site data. As a result of such examination and investigation, the Contractor warrants and represents the full understanding of the intent and purposes of the Contract Documents and the Contractor's obligation thereunder and that the Contractor accepts responsibility for, and is prepared to execute and fulfill completely, by its construction work, the intent of the Contract, without exception and without reservation, at the price specified in the Contract.
- 4.1.2 The Contractor shall carefully study and compare the Contract Documents during the progress of the Work and shall immediately report any error, inconsistency or omission to SU upon discovery. The Contractor shall immediately report any error, inconsistency or ambiguity detected during the course of the project to SU, and shall not continue with any Work which may be affected by such error until SU has had the opportunity to respond to and clarify the Work it wants performed in view of this information. Wherever any error, inconsistency or omission appears, it shall be disposed of pursuant to appropriate procedures set forth elsewhere herein.

- 4.1.3 Unless otherwise ordered in writing by the Owner, the Contractor shall perform no portion of the Work without approved Change Orders, approved shop Drawings, samples, or other approvals as may be applicable and required by the Contract Documents.
- 4.1.4 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all labor, equipment, materials, tools, construction equipment and machinery, water, heat, utilities, transportation and other facilities and services necessary for the proper execution and completion of the Work, whether or not incorporated or to be incorporated in the Work.
- 4.1.5 The Contractor shall, at all times, enforce strict discipline and good order among its employees and shall not employ on the site any unfit person or anyone not skilled in the task assigned to him.
- 4.1.6 The Contractor shall be obligated to pay the prevailing wage rates as posted on the New Jersey Department of Labor's website and shall abide by the requirements of the State's Affirmative Action Program. The Contractor also shall be responsible to ensure that all principles of safety are carried out, as detailed in Article 12 of this document.

# 4.2 New Jersey Prevailing Wage Act

- 4.2.1 Each Contractor and subcontractor shall comply with the New Jersey Prevailing Wage Act Laws of 1963, Chapter 150, (N.J.S.A. 34:11-56.25 *et seq.*) and all amendments thereto, and this act is hereby made a part of every contract entered into on behalf of SU, except those contracts which are not within the contemplation of the act. Provisions of the act include the following stipulations and requirements:
  - a. All Workers employed in the performance of every contract in which the contract sum is in excess of \$2,000 and to which SU is a party shall be paid not less than the prevailing wage rate as designated by the Commissioner, Department of Labor or his or her duly authorized representative.
    - (1) Each Contractor and subcontractor performing public work for SU and which is subject to the provisions of the Prevailing Wage Act, shall post the prevailing wage rates for each craft and classification involved as determined by the Commissioner, Department of Labor. This posting shall include the effective date of any changes thereof, and shall be

displayed in prominent and easily accessible places at the site of the work or at such place or places as are used by the Contractor/subcontractor to pay workers' wages.

(2) At the time of the bid due date, the bidder and the subcontractors must be registered in accordance with "The Public Works Contractor Registration Act" (N.J.S.A.34:11-56.48 et seq.). All questions regarding registration should be addressed to:

Contractor Registration Unit
New Jersey Department of Labor and Workforce Development
Division of Wage and Hour Compliance P O Box 389
Trenton, New Jersey 08625-0389

Telephone: 609-292-9464 Fax: 609-633-8591

- b. In the event it is found that any worker, employed by any Contractor or subcontractor covered by any contract in excess of \$2,000 for any public work to which SU is a party, has been paid a rate of wages less than the prevailing wage required by such contract, SU may terminate the Contractor's or subcontractor's right to proceed with the Work, or such part of the Work as to which there has been failure to pay required wages, and may otherwise prosecute the Work to completion.
- c. Nothing contained in the Prevailing Wage Act shall prohibit the payment of more than the prevailing wage rate to any worker employed on a public work.

#### **4.3** Supervision and Construction Procedures

- 4.3.1 The Contractor shall supervise and direct the Work as skillfully and attentively as possible. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract.
- 4.3.2 The Contractor shall employ a full-time competent person and necessary assistants, who shall be in attendance on the project site during the progress of the Work. The competent person shall represent the Contractor or Contractor's designated representative and all communications given to the competent person shall be as binding as if given to the Contractor. Important communications shall be

confirmed in writing. SU reserves the right to require a change in competent person if the competent person's performance, as judged by SU, is deemed to be inadequate.

The Contractor shall maintain email communication at the project site as well as at their home office.

- **4.3.3** Each Contractor shall employ qualified competent craftsmen in their respective lines of Work.
- 4.3.4 The various subcontractors shall likewise have competent project managers, superintendents and/or foremen in charge of their respective portions of the Work at all times. They shall not employ a person unfit or unskilled in the assigned area of Work. If it should become apparent that a subcontractor does not have its portion of the Work under control of a competent foreman, the responsible prime Contractor shall have the obligation to take appropriate steps to immediately provide proper supervision.

If, due to a trade agreement, standby personnel are required to supervise equipment installation or for any other purpose during the normal working hours of other trades, the Contractor normally required to provide the standby services shall evaluate and include the costs thereof in its bid price and shall provide said services without additional charge.

#### 4.4 Responsibility for the Work

- 4.4.1 The Contractor shall be responsible to SU and to any separate Contractors having a contract with SU on this Project, for the acts employees which injure, damage or delay such other Contractors in the performance of their work. This responsibility is not limited by the applicable provisions stated elsewhere in this document, but is in conjunction with and related to these provisions.
- **4.4.2** Each Contractor shall be responsible for all damage or destruction caused directly or indirectly by its operations to all parts of the Work, both temporary and permanent, and to all adjoining property.
- 4.4.3 Each Contractor shall, at its own expense, protect all finished Work liable to damage and keep the same protected until the project is completed and accepted. In the case of substantial completion accompanied by beneficial occupancy by SU, the Contractor's obligation to protect its finished work shall cease simultaneously with the occupancy of the portion or portions of the structure.
- **4.4.4** Each Contractor shall defend, protect, indemnify and save harmless–SU and the A/E from all claims, suits, actions, damages

and costs of every name and description arising out of or resulting from the performance of the Contractor's Work and every tier of subcontractor working on the project under this Contract. This responsibility is not limited by the provisions of other indemnification provisions included elsewhere in this document.

4.4.5 In order to protect the lives and health of its employees, the Contractor shall comply with all applicable statutes and pertinent provisions of the RSC Safety Manual and shall maintain accurate records of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work arising out of and in the course of employment on work under the contract. The Contractor alone shall be responsible for the safety, efficiency, and adequacy of its plant, appliances and methods, and for any damage or injury which may result from the Contractor's failure or improper construction, maintenance or operation.

# **4.5 Permits - Laws – Regulations**

- 4.5.1 Unless otherwise provided in the Contract Documents, SU will pay for DCA Construction Permit(s) and Special inspection(s) as may be required by the Department of Community Affairs (DCA). The Contractor shall provide in writing to SU all names, addresses, telephone numbers, email addresses, license numbers, and contact persons for all subcontractors who will be used on the project and are required to be listed on the DCA Construction Permit documents within three (3) days after issuance of the Notice of Award. accordance with the New Jersey Uniform Construction Code. No work requiring inspections and approval of construction code officials is to be covered or enclosed prior to inspection and approval by appropriate code enforcement officials.
- **4.5.3** Soil conservation measures are to be in accordance with County Soil Conservation District requirements.
- **4.5.4** All sewage disposal work shall conform to the regulations of the State's Department of Environmental Protection.
- **4.5.5** SU will pay for all code inspections; however, it is each Contractor's responsibility to request inspections in a timely manner as to not delay the Work of the Project.
- 4.5.6 Consistent with Section 4.4.4 of this document, each Contractor and every tier of subcontractor working on the project shall be responsible for and save harmless SU and A/E from all fines, penalties or loss incurred for, or by reason of, the violation of any municipal ordinance or regulation or law of the State while the said work is in progress.

- 4.5.7 All Contractors shall comply with the Federal Occupational Safety and Health Act of 1970 and all of the rules and regulations promulgated there under.
- **4.5.8** As a result of a finding by an appropriate finder of fact that a Contractor caused a substantial violation of a State, local or federal statute or regulation on said project, SU may declare the Contractor to be in default.
- **4.5.9** Prior to the start of any crane equipment operations, each Contractor shall make all necessary applications and obtain all required permits from the Federal Aviation Administration (F.A.A.). The sequence of operations, timing and methods of conducting the work shall be approved by the F.A.A. to the extent that it relates to its jurisdiction.

# 4.6 Storage, Cleaning and Final Clean Up

- 4.6.1 Each Contractor shall confine its apparatus, the storage of its equipment, tools and materials, and its operations and workers to areas permitted by law, ordinances, permits, and contract limit as established in the Contract Documents, the rules and regulations of SU. The Contractor shall not unreasonably encumber the site or the premises with materials, tools and equipment premises and the job site free from the accumulation of all refuse, rubbish, scrap materials and debris caused by its operations, to ensure that at all times the premises and site shall present a neat, orderly, safe, and workmanlike appearance. This is to be accomplished as frequently as is necessary by the removal of such material, debris, etc. from the site and SU's premises. Loading, cartage, hauling and dumping will be at the Contractor's expense.
- **4.6.3** At the completion of the Work, the Contractor shall remove all of its tools, construction equipment, machinery, temporary staging, false work, formwork, shoring, bracing, protective enclosures, scaffolding, stairs, chutes, ramps, runways, hoisting equipment, elevators, derricks, cranes, etc. from the project site.
- 4.6.4 Should the Contractor not promptly and properly discharge its obligation relating to progress cleaning and final clean up, SU shall have the right to employ others and to charge the resulting cost to the Contractor, after first having given the Contractor a three Working day written notice of such intent.
- **4.6.5** The Contractor's responsibilities in final clean up refer to Closeout Section.

4.6.6 All construction equipment, materials or supplies of any kind, character or description of value belonging to the Contractor and which remain on the job site for more than 30 calendar days from the date of the Final Completion issued through SU to the Contractor, shall become the absolute property of SU. It will be disposed of in any manner SU shall deem reasonable and proper.

# 4.7 Cut-Overs, Interruptions to Existing Buildings

4.7.1 All cut-overs of mechanical and electrical services to existing buildings shall be scheduled and coordinated in advance with SU's representative and performed at a time convenient to SU so as not to unreasonably interfere with its operations.

# 4.8 Non-Regular Workdays

4.8.1 Regular working hours shall be 7:00 a.m. to 3:30 p.m., Monday through Friday. Changes thereto may be granted with written approval from SU's representative. Any Work required to be performed after regular working hours or on Saturdays, Sundays, or legal holidays as may be reasonably required and consistent with contractual obligations, shall be performed without additional expense to SU.

The Contractor shall obtain approval from SU's representative for performance of work after regular working hours or on non-regular work days at least 24 hours prior to the commencement of overtime, unless such overtime work is caused by an emergency.

#### 4.9 Drawings, Specifications, Shop and As-Built Drawings

- 4.9.1 SU will furnish, after becoming aware of such need, additional instructions for the proper execution of the Work. All Drawings and instructions issued by SU shall be consistent with the Contract Documents and reasonably inferable from and executed in conformity with the Contract Documents. The Contractor shall do no work without proper Drawings and instructions. In giving such additional instructions, SU will have the authority to make minor changes in the Work, not involving extra cost. Drawings and instructions with such supplementary details furnished or approved are understood to be included and a part of the contract.
- 4.9.2 Where certain of the work is shown in complete detail, but not repeated in similar detail in other areas of the Drawings, or if there is an indication of continuation with the remainder being shown only in outlines, the work shown in detail shall be understood to be required in other like portions of the project.
- **4.9.3** The Contractor is responsible to review the Drawings and Specifications, and information describing the physical

characteristics of the site, including surveys, legal descriptions, data and drawings depicting existing conditions, subsurface conditions, environmental studies, reports or investigations provided by SU or the Architect. The Contractor shall not, at any time after the execution of its Contract, make any claims based upon insufficient data, or the Contractor's incorrect assumption of conditions, or any misunderstandings with regard to the nature, conditions or character of the Work to be performed under the Contract. The Contractor shall assume all risks resulting from any changes in conditions not under the control of SU, which may occur during the progress of the Work.

- 4.9.4 The Contractor shall, together with SU's representative, prepare a schedule of the proposed progress of the Work, fixing the dates when the various details and supplemental Drawings, if any, may be required. Within two weeks of the first field meeting, the Contractor shall submit to the A/E a shop drawing sample submission schedule which shall be used as a basis for complying with the overall progress schedule. Contractor shall also promptly submit, a reproducible transparent copy of all shop or setting drawings, details and schedules required for the Work of the various trades. The A/E will review the sample schedule with reasonable promptness. The Contractor shall promptly make any corrections, if required by the A/E, and resubmit a reproducible transparent copy for approval.
- 4.9.5 The Contractor shall not use the Contract Drawings for submission of shop Drawings. All shop drawing sizes shall be in multiples of 9" x 12" (e.g.,18" x 24", 24" x 27", 24" x 36", etc.) as approved by the A/E.
- 4.9.6 Attached to the Contractor's initial submission of such shop drawings or catalog data shall be an itemized schedule listing dates by which all other submissions will be forwarded to the A/E.

The Contractor also has the responsibility to submit coordination drawings whenever two or more trades are occupying common space. Any list of Drawings prepared by the A/E is for SU's convenience only, and shall not be construed as limiting the number of drawings the Contractor shall furnish.

4.9.7 If the Contractor desires to make any deviations or changes from the requirements of the Contract Documents the Contractor shall obtain the consent of the SU to such changes before submitting drawings showing such proposed changes. All drawings submitted by the Contractor shall have been checked and approved by the Contractor before submission. SU project number and the

Drawings and Specification references shall be noted on all submissions. Failure to comply with these instructions will be sufficient reason to return such drawings to the Contractor without any action being taken.

- 4.9.8 The Contractor shall keep on the project site at all times one set of Drawings to be marked "AS-BUILT." During the course of the Project, the Contractor shall mark these As-Built Drawings with colored pencils to reflect any changes, as well as dimension the location of all pipe runs, conduits, traps, footing depths or any other information not already shown on the Drawings or differing there from. All buried utilities outside the building shall be located by a metes and bounds survey performed by a licensed surveyor who shall certify as to its accuracy. These marked-up As-Built Drawings and surveys shall be made available to SU upon request at any time during the progress of the Work. These shall include the As-Built Drawings of principal sub-Contractors as well.
- 4.9.9 In instances where sepias, shop Drawings and/or erection drawings, of a scale larger than the Contract Drawings, are prepared by a Contractor, such drawings and sepias will be acceptable in lieu of marked-up Contract Drawings, provided they are updated as per section 4.9.8 above. A master sheet of the same dimensions as the Contract Drawings shall be prepared by the Contractor on a tracing which shall indicate, sheet by sheet, a cross-reference to all Shop Drawings pertaining to that drawing. All drawings and sepias as required in section 4.9.8 and this section shall be labeled "ASBUILT" above the title block and dated.
- **4.9.10** The Contractor shall submit the "as-built" documents to the A/E, whether altered or not, with a certification as to the accuracy of the information thereon at the time of contract completion and before final payment will be made to the Contractor. After acceptance by the A/E, the Contractor will furnish two sets of all shop and/or erection drawings used for "as-built" documentation.
- 4.9.11 All "as-built" drawings as submitted by Contractors shall be labeled "AS- BUILT" above the title block and dated. This information shall be checked, edited and certified by the A/E, which shall then transpose such information from the Contractor's "as-built" drawings to the original tracings, certify that such tracings reflect as-built status, and deliver said tracings to SU. Where shop drawings have been used by the Contractor for "as-built" documentation, the tracing providing cross reference information, as described in section 4.9.9 of this document, shall be included in the set of "as-built" drawings furnished to SU.

# 4.10 Samples

The Contractor shall furnish, for approval, all samples as directed. The Work shall be in accordance with approved samples. Such samples shall be submitted promptly to SU, through the A/E, at the beginning of the Work, so as to give SU time to examine them. Any list of samples prepared by the A/E is for SU's convenience only, and shall not be construed as limiting the number of samples the Contractor shall furnish upon request of the A/E.

# 4.11 Miscellaneous Drawings, Charts and Manuals

- 4.11.1 Sleeve and Opening drawings: Prior to installing service utilities or other piping, etc. through structural elements of the building, the Contractor shall prepare and submit, for approval of the architect and structural engineer, accurate dimensional drawings indicating the positions and sizes of all sleeves and openings required to accommodate the Work and installation of the Contractor's piping, equipment, etc. All such drawings must contain reference to the established dimensional grid of the building. Such drawings must be submitted in sufficient time to allow proper coordination with reinforcing steel shop drawings and proper placing in the field.
- 4.11.2 Control Value and Circuit Location Charts and Diagrams: Plumbing, HVAC and electrical Subcontractors shall prepare a complete set of inked or typewritten control valve and circuit location diagrams, charts and lists identifying and locating all such items, and shall place the charts, diagrams and lists under frame glass in appropriately designated equipment rooms, as directed. These Subcontractors shall also furnish one-line diagrams, as well as such color coding of piping and wiring and identifying charges as specified or required. This information is to be framed under glass and displayed where directed.

#### 4.12 Openings - Channels - Cutting and Patching

The Contractor shall be responsible for furnishing and setting of sleeves, builtin items, anchors, inserts, etc. for its Work and for all cutting, fitting, closing in, patching, finishing, or adjusting of its Work in new and/or existing construction, as required for the completed installation. Where applicable, the Contractor shall build these items into the construction.

- 4.12.1 The Contractor for general construction shall build recesses, channels, chases, openings and flues and shall leave or create holes where indicated on Drawings, or where directed, for steam, water or other piping, electrical conduits, switch boxes, panel boards, flues and ducts, or any other feature of the heating and ventilating Work. At least three copies shall be furnished to SU.
- **4.12.2** The Contractor for general construction shall close, build-in, and

finish around or over all openings, chases, channels, pockets, etc., after installation has been completed.

**4.12.3** Approval in writing from the Architect must first be obtained by the Contractor before cutting or boring through any floor beams, floor construction or supporting members.

#### **4.13** Tests

- 4.13.1 The Contractor shall notify SU's authorized representative in writing of all work required to be inspected, tested or approved. The notice shall be provided no later than five (5) working days prior to the scheduled inspection, test or request for approval. The Contractor shall bear all costs of such inspections, tests or approvals, except for code inspections as stated in section 4.5.6 of this document. Additionally, Contractor shall be responsible to monitor the progress of all such inspections, tests or requests or approvals and notify SU's authorized representative immediately about any delays, failure to obtain any approval, or requirement for re-inspection or re-testing.
- 4.13.2 When mechanical, electrical or other equipment is installed, it shall be the responsibility of the installing Contractor to maintain, warrant and operate it for such period of time as required by the Contract Documents or as necessary for the proper inspecting and testing of the equipment and for adequately instructing SU's operating personnel. All costs associated with the maintenance, warranty, operations, inspection and testing of equipment, as well as instructing SU personnel, shall be borne by the Contractor. All tests shall be conducted in the presence of, and upon timely notice to, SU prior to acceptance of the equipment.
- **4.13.3** When SU requires special or additional inspections, testing or approvals, SU will direct the Contractor in writing to secure the service for such special or additional inspections, testing or approvals, and the Contractor shall give notice as detailed in section 4.13.1 of this document. In the event such special or additional inspections or testing reveal a failure of the Work to comply with the terms and conditions of the contract, the Contractor shall bear all costs thereof, including all costs incurred by SU made necessary by such failures.
- 4.13.4 The Contractor shall acquire inspection or testing services and manage the process using only those firms/entities provided by SU as may be required by the Contract Specifications.
- 4.13.5 All submittals of inspections and test reports or requests for approval shall be accompanied by a certification signed by the Contractor, attesting to the Contractor's knowledge of the submittal, acceptance of

its findings, acknowledgment that material testing meets the required standards, and certification of the report's representation of the facts. Failure to provide the written certification shall be grounds for rejection of the submittal.

4.13.6 In addition to the above, the Contractor agrees to insert in all contracts/purchase orders for inspection and testing the requirement for the inspection or testing firm/entity to submit, in conjunction with the report to the Contractor, a copy of the report directly to SU. The copy shall be held pending receipt of the Contractor's certification of the report. Further, the Contractor agrees to require all reports to be submitted within 14 calendar days of the test or inspection. Failure to provide reports within the required time shall be addressed pursuant to section 10.3.9 of these General Conditions.

#### 4.14 Equipment – Materials

- 4.14.1 The Contractor warrants to SU and the A/E that all materials and equipment furnished under the Contract will be new, unless otherwise specified, and that all Work will be of good quality, free from faults, defects, and in conformance with Contract Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective and rejected by SU or the A/E. If required by the A/E or SU, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This warranty is not limited by the provisions of the other paragraphs contained in this document.
- 4.14.2 The original and two (2) copies of the request for approval of materials shall be forwarded to the A/E for approval. Each item of material listed shall be marked "As Specified" or "Unspecified" as the case may be.
- 4.14.3 The Contractor shall furnish and deliver the necessary equipment and materials in ample quantities and as frequently as required to avoid delay in the progress of the Work and shall store them so as not to cause interference with the orderly progress of the project.
- **4.14.4** The Contractor shall furnish and pay for all necessary transportation, storage, scaffolding, centering, forms, water, labor, tools, light and power and mechanical appliances and all other means, materials and supplies for properly prosecuting the Work under this Contract, unless expressly specified otherwise.

The Contractor shall make arrangements to have its representatives at

the site to accept delivered materials. SU will not accept materials, nor will they be held responsible for damage, theft, or disappearance of Contractor's materials, equipment, tools, etc.

4.14.5 No materials, equipment, or supplies for the Work shall be purchased by the Contractor or any subcontractor subject to any lien or encumbrance or other agreement by which an interest is retained by the seller. The Contractor warrants, by signing its invoice, that it has good and sufficient title to all such material, equipment and supplies used by it in the Work, free from all liens, claims or encumbrances.

#### 4.15 Substitutions

- 4.15.1 In the event the Contractor should propose a substitution of the specified equipment or materials, it shall be its responsibility to submit proof of equality and to provide and pay for any tests which may be required by SU in order to evaluate such proposed substitution.
- **4.15.2** Where any particular brand or manufactured article is specified, it shall be regarded as a standard. Similar products of other manufacturers, capable of equal performance and quality, in the opinion of SU, will be accepted if approved.
- **4.15.3** Application for approval of a substitution by the Contractor shall include or conform to the following requirements:
  - a. Furnish full and complete identification information including whether the item is included in the Specifications; in which case, identify the specification paragraph and section.
  - b. Attach data indicating in detail whether and how the substitution differs, if at all, from the article specified. Submit documents which demonstrate proof of equality, along with an agreement to have such tests performed at the Contractor's own expense as may be required for approval by SU Representative or the A/E.
  - c. If a credit is to be offered for the substitution, provide a detailed itemization of the amount of credit.
  - d. If the proposed substitution involves a change in Scope of the Work of the Contractor or any subcontractor or trade under the Contract Documents, then the Contractor agrees to be responsible for any and all resulting added costs including any redesign.

4.15.4 Substitution requests will not be considered until after the receipt of bids. After the award, in the event the lowest bid contractor proposes a substitution of the specified equipment or materials, its shall be their responsibility to submit proof of equality in accordance with the procedure outlined in Section 4.15 of the General Conditions. If the proposed substitution is rejected as an equivalent or better, the contractor shall be required to provide the specified equipment or materials.

# 4.16 Subcontractor Approvals

4.16.1 Approval of a subcontractor or material supplier by the SU Representative and A/E shall not relieve the Contractor of the responsibility of complying with all provisions of the Contract Documents. The approval of a subcontractor does not imply approval of any material, equipment or supplies.

#### 4.17 Soil Borings

4.17.1 Soil borings or test pits or other subsurface information may be secured by an independent Contractor for SU prior to design and construction of a project and may be included in the Contract Documents for the Contractor's use.

The Contractor assumes full responsibility for interpretation of said borings, and SU shall have no responsibility or liability should the data provided prove to be incorrect or not representative. Other soil boring results and interpretations taken and made by the Contractor shall be provided to SU.

#### **4.18** Protection of Contractor's Property

**4.18.1** The Contractor shall adequately secure and protect its own tools, equipment, materials and supplies. SU assumes no liability for any damage, theft or negligent injury to the Contractor's property.

#### 4.19 Patents

- **4.19.1** The Contractor shall hold and save the SU and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for or on account of any patented or non-patented invention, process, article or appliance manufactured or used in the performance of the contract, including its use by SU, unless otherwise specifically stipulated in the Contract Documents.
- **4.19.2** License and/or royalty fees for the use of a process which is authorized by SU must be reasonable, and paid to the holder of the patent or his or her authorized licensee directly by SU and not by or through the Contractor.

4.19.3 If the Contractor uses any design, device or materials covered by letters, patent or copyright, it shall provide for such use by suitable agreement with SU or such patented or copyrighted design, device or material. It is mutually agreed and understood that, without exception, the contract prices shall include all royalties or costs arising from the use of such design, device or material in any way involved in the Work. The Contractor and/or its sureties shall indemnify and save harmless SU from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or material, or any trademark or copyright in connection with Work agreed to be performed under this Contract and shall indemnify SU for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the Work or after the completion of the Work.

#### 4.20 Right to Audit

**4.20.1** SU reserves the right to audit the records of the Contractor in connection with all matters related to its contract. The Contractor agrees to maintain its records in accordance with generally accepted accounting principles, for a period of not less than three (3) years after receipt of final payment.

"Generally accepted accounting principles" is defined as follows: Accounting records must identify all labor and material costs and expenses, whether they are direct or indirect. The identity must include at least the project number for direct expenses and/or account number for indirect expenses. All charges must be supported by appropriate documentation including, but not limited to, canceled checks and other supporting documentation.

- 4.20.2 The Contractor shall develop, maintain and make available to SU on request such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, change orders, all original estimates, takeoffs and other bidding documents, all subcontractors and supplier contracts and changes, all records showing all costs and liabilities incurred or to be incurred in connection with the project (including all subcontractor and supplier costs), all payment records and all records showing all costs incurred in labor and personnel of any kind, records and other data as SU may request concerning Work performed or to be performed under this Contract.
- **4.20.3** The Contractor acknowledges and agrees that no claim for payment which is premised to any degree upon actual costs of the Contractor shall be recognized by SU except and to the extent that such actual costs are substantiated by records required to be maintained

under these provisions.

- 4.20.4 The Contractor shall require each subcontractor, to the extent of the Work to be performed by the subcontractor, to be bound to the Contractor to the terms of SU's Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor assumes, by these documents, to SU and its contractual parties.
- **4.20.5** The Contractor shall not grant to any subcontractor terms more favorable than those extended to the Contractor by SU.
- 4.20.6 The Contractor acknowledges and agrees that its obligation to establish, maintain and make available records and SU's right to audit as delineated herein shall extend to actual costs incurred by subcontractor in performing Work required under the contract or any supplemental agreement thereto. The Contractor shall require in each subcontract that the subcontractor establish, maintain and make available to SU all records as defined and delineated herein, relating to all Work performed under the subcontractor including Work performed by a sub- subcontractor.

#### 4.21 Contract Closeout

- **4.21.1** Contract Closeout is described as certain collective Contract requirements indicating completion of the Work that are to be fulfilled near the end of the Contract time in preparation for final completion of the Work as well as final payment to the Contractor.
- **4.21.2** Contract Closeout is directly related to Substantial Completion therefore, the time of closeout may be either a single time period for the entire Work or a series of time periods for individual elements of the Work that have been certified as Substantially Complete at different dates.
- **4.21.3** Contract Closeout submittal includes but may not be limited to:
  - 1) Record Documents described throughout Contract Documents.
  - 2) As Built Drawings; disk and hard copy of both PDF & AutoCAD v. 2009 drawing files
  - 3) Warranties as required by Specifications.
  - 4) Copy of Final Change Order, if applicable.
  - 5) Copy of Final Application for Payment.
  - 6) Consent of Surety to Final Payment.
  - 7) Copy of Certificate Approval or Certificate of Compliance.
  - 8) Contractor's Confirmation of General Warranty.
  - 9) Letter from A/E that all Punch List items have been completed

- to their satisfaction.
- 10) Operating, Instruction and Maintenance Manuals for Equipment (Mechanical, Plumbing, Electrical, etc.) all in accordance with the Specifications.
- 11) Contractor's Affidavit of training to SU in proper operation and maintenance of systems, equipment and similar items which were provided as part of the Work.
- 12) Attic stock in accordance with the specifications.
- **4.21.4** Substantial Completion The Contractor shall complete the following before requesting the A/E and/or SU representative inspection for Certification of Substantial Completion either for the entire Work or portions of the Work.
  - 1) Contractor shall apply for, and SU have in its possession, DCA's Certificate granting occupancy or use.
  - 2) The Contractor is to complete the work as is outlined within the Punch List as has been developed and issued by the A/E.
  - 3) After completion of the punch list, A/E and/or SU representative will inspect to determine status of completion.
  - 4) Should the A/E or SU representative determine that the Work is not Substantially Complete, the A/E or SU representative will promptly notify the Contractor, in writing, giving the reasons therefore
  - 5) The Contractor shall remedy the deficiencies and notify the A/E and/or SU representative when ready for re-inspection
  - 6) The A/E and SU representative will re-inspect the Work. When the A/E and SU representative concur that the Work is Substantially Complete, the Contractor will be notified in writing of any outstanding Punch List items to be completed or corrected as verified by the A/E and SU representative.
  - 7) Contractor shall certify that:
    - a. Work has been inspected for compliance with the Contract Documents.
    - b. Work has been completed in accordance with the Contract Documents.
    - c. Equipment and systems have been tested, as required, and are operational.
    - d. Work is completed and ready for final inspection.
- **4.21.5** Final Completion The Contractor shall complete the following before requesting the A/E and/or SU representative final inspection for Certification of Final Completion of the Work and final payment.
  - 1) Contractor shall apply for and SU shall have in its possession DCA's Final Certificate granting occupancy or use.
  - 2) A/E and SU representative will conduct an inspection to verify status of completion.

- 3) Should the A/E and/or SU representative determine that the Work is incomplete or defective:
  - a. The Contractor will promptly be notified, in writing, listing the incomplete or defective Work.
  - b. The Contractor shall remedy the deficiencies promptly and notify the A/E and SU representative when ready for re-inspection.
  - c. When the A/E and SU representative determine that the Work is acceptable under the Contract Documents and that all required submittals have been made, SU representative will request the Contractor to submit a final application for payment.
- **4.21.6** Final Cleaning The Contractor's responsibilities in final cleaning include but, may not be limited to the following:
  - 1) Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior surfaces. Materials and rubbish shall not be thrown from building openings above the ground floor unless contained within chutes.
  - 2) Repair, patch and touch-up marred surfaces to match adjacent finishes.
  - 3) Clean ducts, blowers, and coils if air conditioning or heating units were operated during construction and replace all filters accordingly.
  - 4) Sweep, mop, and buff resilient floors and base.
  - 5) Dust walls, metal, wood, and similar finished materials.
  - 6) Clean all cabinet and casework.
  - 7) Dust and wash all plumbing and electrical fixtures. Remove stickers from all fixtures and devices accordingly.
  - 8) Wash and buff or polish all non-resilient materials.
  - 9) Vacuum carpet floors; clean as necessary.
  - 10) Vacuum all floor areas if scheduled to receive floor finish by others.
  - 11) Wash and polish all glass, inside and out; remove stickers and labels accordingly.
  - 12) Replace broken or scratched glass with new glass.
  - 13) Restore all landscaping, roadways and walkways to preexisting conditions. Damage to trees and plantings shall be repaired in the current or next planting season and such shall be guaranteed for one year from the date of repair and/or replanting.

# 5. ARTICLE 5 – CONTRACTOR FOR GENERAL CONSTRUCTION: SPECIAL RESPONSIBILITIES

# 5.1 Unique Role of Responsibility – Staffing

5.1.1 The Contractor for general construction (hereinafter referred to as the Contractor) has the responsibility for being the supervisor, manager, overseer, coordinator and expediter of all of the Contractors and of the total construction process and all of its parts, in accordance with the Contract Documents.

#### 5.2 Control and Coordination of Construction

- 5.2.1 SU relies upon the organization, management, skill, cooperation and efficiency of the Contractor to supervise, direct, control and manage the general construction work and the efforts of the other Contractors, so as to deliver the completed Project in conformance with the Contract Documents and within the scheduled time. 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 A/E in the A/E's administration of the Contract, or by tests, inspections or approvals required or performed by other persons other than the Contractor, or other Contractors engaged by SU to perform specific work.
- 5.2.2 The Contractor shall include in its bid an amount sufficient to cover the cost of furnishing necessary administrative and supervisory forces to coordinate its Work and that of its Subcontractors.
- 5.2.3 All Subcontractors shall be responsible to the Contractor for performance of their contract work and for meeting those dates within the final project progress schedule.

# 5.3 Layout and Dimensional Control – Surveying

- 5.3.1 The Contractor shall be responsible for locating and laying out the building and all of its parts on the site, in strict accordance with the Drawings, and shall accurately establish and maintain dimensional control. The Contractor shall employ and pay for the services of a competent and licensed New Jersey engineer or land surveyor (who shall be approved by DPMC) to perform all layout work, and to test the level of excavations, footing base plates, columns, walls and floor and roof lines, and furnish to the A/E, as the Work progresses, certifications that each of such levels is as required by the Drawings. The plumb lines of walls, etc., shall be tested and certified by the surveyor as the Work progresses.
- 5.3.2 The engineer/surveyor, in the course of layout work both on the site and within the building, shall establish all points, lines, elevations, grades and bench marks for proper control and execution of the Work. The engineer/surveyor shall establish a single permanent bench mark

as directed, to which all three coordinates of dimensional control shall be topographical and utility survey data and all points, lines, elevations, grades and bench marks. Should any discrepancies be found between information given on Drawings and the actual site or field conditions, the Contractor shall notify the A/E of such discrepancy, and shall not proceed with any Work affected until receipt of written instructions from the A/E.

#### **5.4** Construction Access Routes

5.4.1 The Contractor shall be responsible for providing and maintaining unobstructed traffic lanes on the designated construction access routes either shown on the Contract Drawings or reasonably required so as to perform the Work, and shall provide and maintain all reasonably required safety devices. The Contractor shall provide any necessary additional materials, their grading and compaction, and shall remove snow and debris as necessary to provide and maintain the general serviceable condition of the access roadbed, as well as pedestrian ways.

#### 5.5 Project Sign

- **5.5.1** The Contractor shall erect and maintain one sign at the project site, as shown on the Drawings and located as directed by the A/E.
- **5.5.2** Painting shall be done by a professional sign painter, with two coats of exterior paint, colors, letter face and layout as shown. No other sign will be permitted at the site.
- **5.5.3** Upon completion of the Project, and when directed by the A/E or SU representative, the Contractor shall remove the sign. Should there be a change in the listed State officials; the Contractor shall make appropriate changes to the sign at its expense.

#### 5.6 **Dust Control**

**5.6.1** The Contractor, at its expense, shall provide and maintain necessary temporary dust-proof partitions around areas of work in any existing building or in new building areas as directed by the A/E or SU representative.

#### 5.7 Repair of Finished Surfaces, Applied Finishes, Glass

**5.7.1** The Contractor accepts sole responsibility for repair of uncontrolled dislodging, cracking, delaminating or peeling of finished surfaces such as concrete, pre-cast concrete, cast and natural stone, unit masonry, millwork, plaster, glass and applied finishes such as paint, and special coatings, within the contract scope and the limits of specified guarantee periods, regardless of the cause.

- 5.7.2 The Contractor shall be responsible for replacement of all broken glass installed by it or by its subcontractors, after same has been installed, no matter by whom or what caused. The Contractor shall replace all broken, scratched or otherwise damaged glass before the completion and acceptance of the Work. The Contractor shall wash all glass on both sides at completion, or when directed, removing all paint spots, stains, plaster, etc.
- **5.7.3** Nothing herein is intended to limit the right of the Contractor to seek payment from the party responsible for damages.

#### 5.8 Photographs

- **5.8.1** With each application for payment until the exterior is completed, the Contractor shall submit progress photographs of the building, in duplicate to SU's representative, giving two views of each building as selected by the A/E, taken from the same points each month. This requirement shall apply to the creation of the new space only.
- 5.8.2 The photographs shall be 8" by 10", shall bear the date of the exposure, SU project number and title and the names of the Contractor and the A/E. Fifty (50) digital images shall be submitted along with the traditional photographs indicated in section 5.8.1 above at the Contactor's option.

# 5.9 Warranty

- 5.9.1 Neither the final certificate of payment, nor any provision in the Contract Documents, nor partial or entire occupancy of the premises by SU shall constitute an acceptance of Work not done in accordance with the Contract Documents, nor shall it relieve the Contractor of liability with respect to any expressed or implied warranties or responsibility for faulty materials or workmanship. SU will give notice of observed defects with reasonable promptness.
- 5.9.2 In addition to warranties otherwise specified in other sections of the Specifications, the Contractor and each individual subcontractor shall guarantee and warrant, in writing, the Work to be performed and all materials to be furnished under this Contract against defects in materials or workmanship, and shall pay for the value or repair of any damage to other work resulting there from for a period of one year or as specified from the date of Substantial Completion. All warranties, bonds, etc. required by the Specifications shall be in writing in requisite legal form and delivered to SU no later than time of submission of the invoice for final payment.

- **5.9.3** All subcontractors' warranties, bonds, etc. shall be underwritten by the Contractor, which shall obtain and deliver same to SU before the Work shall be deemed finished and accepted.
- 5.9.4 The Contractor shall, at its own expense and without cost to SU, within a reasonable time after receipt of written notice thereof, and without negatively impacting SU operations related to the Work, make good any defects in material or workmanship which may develop during stipulated guarantee periods, as well as any damage to other work caused by such defects or by their repairs. Any other defects in materials or workmanship not reasonably observable or discovered during the warranty period shall be repaired and/or replaced at the Contractor's expense, and such shall be completed within a reasonable time after written notice is given to the Contractor.
- 5.9.5 It is anticipated that certain permanent equipment will have to be activated during construction of the project to support construction operations. This would particularly be the case with respect to service elevators and those portions of the permanent heating system which might be required to provide temporary heat for interior finish operations. Regardless of when equipment is activated for use during construction, all equipment warranties must extend for the time periods required in these Specifications, starting as of the date of Substantial Completion or Final Completion of the Project by SU. All Contractors shall include in their base bids all costs necessary to provide extended warranties as necessary for any equipment which may be activated prior to final building acceptance by SU.

#### 5.10 Security Services

**5.10.1** The Contractor shall provide security services throughout the period of construction to adequately protect the Work, stored materials and temporary structures located on the premises, and to prevent unauthorized persons from entering the construction site. The period of time and the hours of the day or night required for such services shall be established by the Contractor for general construction and must be sufficient to insure all Contractors' equipment and materials are adequately protected. If SU determines that adequate protection is not being provided and directs the Contractor for general construction to increase the service, such protection shall be provided at no extra cost to SU.

# 6. ARTICLE 6 -- TEMPORARY FACILITIES, UTILITIES AND SERVICES

#### **6.1** Field Offices

**6.1.1** The Contractor will provide onsite and maintain during the project construction a suitable weather-tight insulated field office conveniently located for reception and continuous use, and shall maintain therein a complete set of Contract Documents including Drawings, Specifications,

CPM network diagrams, Change Orders, logs, other details and correspondence. The field office shall contain approved and safe heating facilities and lighting, convenience outlets, a fire extinguisher, a minimum of two operating windows of 15 square feet each and an outside door with a handle, hasp and padlock.

- 6.1.2 The field office may be removed upon enclosure of the building at a time directed by SU representative or the A/E; contents and operations will be transferred to the interior of the project building by the Contractor, and said offices shall be maintained by the Contractor until Final Completion of the Project, unless otherwise directed by SU.
- **6.1.3** The Contractor shall be responsible for the maintenance of all temporary offices, janitorial service and other incidentals.
- **6.1.4** Each Contractor shall provide its own telephone, data lines and equipment at no cost to the University.

#### 6.2 Temporary Storage, Staging and Shelter Structures

6.2.1 Each Contractor will provide and maintain, for its own use and as each deems necessary, suitable and safe temporary storage, tool shops, and employees' sheds for proper protection, storage work and shelter, respectively. Each Contractor shall maintain these structures properly and remove them at the completion of Work. Locations shall be directed by the Contractor. The Contractor making use of these areas shall be responsible for correcting defects and damage caused by such use and for keeping these areas clear and clean.

#### **6.3** Temporary Construction Operations/Services Facilities

**6.3.1** Each Contractor shall be responsible for providing for its own requirements relative to storage areas, employee vehicular parking, equipment marshaling areas, excavation borrow/spoils designated areas, commercial canteen areas, etc. The Contractor shall locate these areas to suit project requirements, with SU's concurrence.

#### **6.4** Temporary Toilet Facilities

- **6.4.1** The Contractor shall provide and pay for suitable temporary toilets at an approved location on the site and prior to the start of any field Work. They shall comply with SU, State, local laws, and regulations. The Contractor will be responsible for maintenance, removal and relocation as described hereinafter.
- **6.4.2** Toilets shall be serviced by a firm qualified and experienced in such functions.

- **6.4.3** Toilets shall be of the portable chemical type, mounted on skids, with screened enclosures with doors, each having a urinal and water closet.
- **6.4.4** Each unit shall be serviced at least twice a week, including the removing of waste matter, sterilizing, recharging tank, refilling tissue holders, and thoroughly cleaning and scrubbing of entire interior, which shall be maintained in a neat and clean condition.
- **6.4.5** When toilets are connected to water and sewer lines, precautions shall be taken to prevent freezing.
- **6.4.6** The temporary toilet units shall be removed from the Work site at the completion of the Work, or when so directed by SU or the A/E.
- **6.4.7** Workers are not to use existing SU facilities.

# 6.5 Temporary Drives and Walks

- 6.5.1 The Contractor shall be responsible for keeping all roadways, drives and parking areas within or proximate to the site free and clear of debris, gravel, mud or any other site materials by ensuring that all reasonably necessary measures are taken to prevent such materials from being deposited on such surfaces. This includes, as may be appropriate, the cleaning of vehicle wheels, etc., prior to exit from the construction site. Should such surface require cleaning, the Contractor will clean these surfaces without additional cost to SU. The Contractor will be held accountable for any citations, fines or penalties imposed on SU for failing to comply with local rules and regulations.
- 6.5.2 Should the Contractor elect to commence construction of permanent driveways, parking areas or walks (other than general grading of temporary shop areas), the Contractor shall not do so without the approval of SU's representative. The Contractor shall not do so without having prepared the subgrade, as may be elsewhere required by the Specifications, nor will the Contractor be relieved from any responsibility for providing additional materials or for reworking the subgrade prior to completion of the Work, if so required to make the improvements conform fully with the Specifications.
- 6.5.3 The Contractor shall obtain permission in writing from SU before using any existing driveways or parking areas not specifically designated for such use in the Contract Documents for construction purposes.

The Contractor shall maintain such driveways and areas in good condition during the construction period, and at completion of the project shall leave them in the same condition as at the start of the

Work. Conditions before use should be carefully photographed or documented by the Contractor.

## 6.6 Temporary Water

- water supply to a convenient location for the use of all Contractors on the project during the period of construction, either by means of the permanent water supply line, or by the installation of a temporary water supply line. If the source of water supply is a well, provisions covering the supply water will include the installation of necessary power-driven pumping facilities by the plumbing Contractor. The well shall also be protected against contamination. The water supply shall be tested periodically by the Contractor, and if necessary, shall be chlorinated and filtered. All costs in providing water, other than the cost of the water itself, will be borne by the Contractor. Electrical services and hookups will be provided by the Contractor, which will pay all costs for this electrical Work. Should pumps be installed in connection with this water supply, electrical connections will be provided and paid for by the Contractor.
- **6.6.2** Temporary water may or may not be provided by SU at no charge to the Contractor, provided and to the extent it may be existing and available at the site immediately prior to and during construction. It is the obligation of Contractor requiring temporary facilities to investigate and make specific arrangements with the using agency for such facilities and to include in its proposal the cost of any additional facilities the Contractor may require for proper conduct of its Work.
- **6.6.3** The Contractor shall install its temporary and/or permanent water lines to the boiler room and heating equipment in sufficient time to be available for supplying water for testing and operation of the heating system, when such are needed to supply heat for the project.
- **6.6.4** The Contractor is responsible to protect all water lines from damage or freezing, be they permanent or temporary. Should water connections be made to an existing line, the plumbing Contractor shall provide a positive shut-off valve at its own cost and expense.
- **6.6.5** If the Contractor fails to carry out its responsibility in supplying water as set forth herein, the Contractor shall be held responsible for such failure, and SU shall have the right to take such action as is deemed proper for the protection and conduct of the Work and may deduct the cost involved in so doing from any sums due the Contractor.
- **6.6.6** The unauthorized use of campus fire hydrants as a source of temporary water is strictly prohibited. Unauthorized use of a campus fire hydrant may result in the immediate shut-down of the Project.

# 6.7 Temporary Light and Power

- **6.7.1** The Contractor shall extend electrical service to the building or buildings at locations approved by SU; temporary electrical service shall be independent of the existing permanent service.
- 6.7.2 The Contractor shall pay for the cost of all electric energy used on distribution lines installed by the Contractor until the project is accepted by SU. The Contractor shall provide and pay for all maintenance, servicing, operation and supervision of the service and distribution facilities. The Contractor shall also connect, maintain and service any electrical equipment installed by the HVAC Contractor which may be necessary for maintaining heat whenever heat is required in the building, whether from the temporary or permanent system.
- 6.7.3 If the Contractor fails to carry out its responsibility in the supplying of uninterrupted light and power or other utility as set forth herein shall be held responsible for such failure and SU shall have the right to take such action as is deemed proper for the protection and conduct of the Work and shall deduct the costs involved from the amount due the Contractor.
- 6.7.4 There shall be no additional cost to SU because of standby requirements due to conflict in the normal working hours of the various trades. The Contractor shall provide temporary light and power to all trades during normal working hours of such trades. Where overtime work by the Contractor necessitates standby electricians or other trades, the Contractor shall be responsible for making appropriate arrangements, financial and otherwise, for such service at no cost to SU.
- **6.7.5** The Contractor shall observe the requirements of the Federal Occupational Safety and Health Act of 1970 with regard to temporary light and power.

## **6.8** Temporary Heat

- **6.8.1** Prior to the building being enclosed by walls and roof, if the outside temperatures shall fall below 40 degrees F. at any time during the day or night, and heat is required for Work in progress or for its protection, the Contractor shall furnish, at their expense, acceptable means to provide sufficient temporary heat to maintain a temperature of not less than 45 degrees F.
- 6.8.2 Heating of field offices, storage spaces, concrete and masonry materials and working area, as required, shall be provided by the responsible Contractors.

- **6.8.3** As soon as the Contractor determines that the building, or a major unit thereof, is "generally enclosed" by walls and roof, the responsibility of supplying working area heat shall rest with the Contractor. When the outside temperature falls below 40 degrees F. at any time during the day or night, the Contractor shall furnish sufficient heat by the use and maintenance of LP gas heaters or other acceptable means to maintain a temperature of not less than 45 degrees F. within the enclosed area of the building at all times, and shall remove such heaters when no longer required.
- **6.8.4** The Contractor will be held responsible for providing temporary heat for all damages resulting from freeze-ups as a result of its Work.
- 6.8.5 The Contractor shall not assume that the permanent heating system or any part thereof will be available for furnishing of temporary heat during the period for which temporary heat is the responsibility of the Contractor. The Contractor's base bid price shall therefore include the cost of all equipment necessary for providing temporary heat as required under these Specifications.
- **6.8.6** All heating equipment at a minimum shall be OSHA-approved and connected to approved flues to the atmosphere.
- **6.8.7** Storage of cylinders within the building will not be permitted at any time. Fire extinguishers shall be provided by the Contractor on each floor where heaters are used and the areas must be adequately ventilated.
- **6.8.8** Contractors responsible for providing temporary heat shall train at least two dependable persons to oversee temporary heat operations.
- **6.8.9** For the purposes of establishing the beginning of the Contractor's obligation to provide temporary heat, a building or major unit thereof shall be considered generally enclosed when (a) the exterior walls have been erected, (b) a temporary roof or permanent roof is installed and in watertight condition, and (c) temporary or permanent doors are hung and window openings are closed with either permanent or temporary weather-tight enclosures (cardboard or woven materials are not to be used; however, any impervious transparent material reasonably intended for such purpose is acceptable).
- **6.8.10** SU reserves the right to permit the substitution of limited temporary enclosures in lieu of permanent construction for the attainment of a permanently tight building if such action is deemed by SU to be in the best interest of the project. This action will not be such as to create a future jeopardy to the environment integrity of the building as construction proceeds.

- **6.8.11** When the permanent heating system provided by the Contractor is the source of the heat, the Contractor shall be responsible for paying for all water, electricity and fuel required for the operation of the permanent heating system until SU assumes beneficial occupancy/use of the project.
- **6.8.12** Should electricians be required to supervise and maintain electrical equipment required for the provision of heat, the payment for the services of the supervisors and/or maintenance personnel shall be the responsibility of the Contractor.

Should the proper type of electric service not be available to supply electrical energy for the operation of the heating system in supplying temporary heat, it shall be the responsibility of the Contractor to provide a motor-driven generator unit of sufficient capacity, voltage and phasing to provide uninterrupted service for the operation of the heating system.

The Contractor shall pay the cost of all fuel consumed in the operation of the generating unit for supplying temporary heat. The Contractor shall provide uninterrupted electrical service to the heating, water and pumping equipment.

**6.8.13** If additional heat is required beyond that specified herein, the Contractor requiring such additional heat shall arrange and pay the additional costs thereof, at no expense to SU.

## 7. ARTICLE 7 – SUBCONTRACTORS

#### 7.1 Contractor - Subcontractor Relationship

7.1.1 Within 14 calendar days after award of the Contract, the Contractor shall provide written notification to SU of the names of subcontractors, other than those required to be listed in the bid proposed or as required for DCA Construction Permit to perform the principal parts of the Work and of such others as SU may direct. Contractor shall not employ any subcontractor without prior acceptance by SU, or any subcontractor that SU may reject within a reasonable time. The Contractor shall not employ any subcontractor that has been debarred, suspended or proposed for debarment by the State of New Jersey. The Contractor shall be responsible to review the debarment list each week, and notify SU of any change of status of any subcontractors. The Contractor shall certify in writing to SU all subcontractors used for the project have not been debarred, suspended or proposed for debarment by the State of New Jersey.

The list of proposed Subcontractors may be considered approved by SU if no reply is forwarded to the Contractor within 15 calendar days following receipt of the list by SU.

- **7.1.2** If SU has reasonable objection to any such proposed subcontractor, the Contractor shall substitute another subcontractor to which SU has no reasonable objection. Under no circumstances shall SU be obligated for additional cost due to such substitution.
- **7.1.3** The Contractor shall make no substitution for any subcontractor, person or firm previously selected and approved, without written notification to SU and receipt of SU's written approval for such substitution.
- **7.1.4** The Contractor acknowledges its full responsibility to SU for the acts and omissions of its subcontractors, and of persons and firms either directly or indirectly employed by them, equally to the extent that the Contractor is responsible for the acts and omissions of persons and firms directly or indirectly employed by it. Contractor acknowledges that it remains fully responsible for the proper performance of its contract irrespective of whether work is performed by the Contractor's own forces or by subcontractors engaged by the Contractor.
- **7.1.5** Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractor and SU.
- **7.1.6** By an appropriate agreement, written where legally required for validity, the Contractor shall require each subcontractor, to the extent of the Work performed by the subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these documents, assumes toward SU, the A/E and the other separate prime Contractors.
  - Where appropriate, the Contractor shall require each subcontractor to enter into similar agreements with its sub-subcontractors.
- **7.1.7** The Contractor and all subcontractors agree that, in the employment of both skilled and unskilled labor, preference shall be given to residents of the State of New Jersey and eligible "Commerce-registered" small businesses, if such labor force is available.
- **7.1.8** The subcontractor or material supplier shall not relieve the Contractor, of the responsibility of complying with all provisions of the Contract Documents.

## 8. ARTICLE 8 - RELATIONSHIP BETWEEN OWNER & CONTRACTOR

## 8.1 Owner's Right to Perform Work

**8.1.1** SU may, and reserves the right to, enter upon the premises at any and all times during the progress of the Work, or cause others to do so, for the purpose of installing any apparatus or carrying on any construction not included in these Specifications or for any other reasonable purpose.

## 8.2. Mutual Responsibility

- **8.2.1** The Contractor shall afford SU reasonable opportunity introduction and storage of their materials and equipment and the execution of their Work. The Contractor shall coordinate its Work with adjacent work and with other trades, so that no portion of the Work is delayed or not properly undertaken due to such lack or failure of cooperation.
- **8.2.2** The Contractor shall lay out and install its Work at such time or times and in such manner as to facilitate the general progress of the Project.
- 8.2.3 Before the completion of the Work contemplated herein, should it be deemed necessary by SU to do any work whatsoever in or about the structure, other than as provided for in the Contract Documents, the Contractor shall fully cooperate with such other individual or firm as SU may employ to do such work, so that such additional work may be performed without unreasonable interference. The Contractor shall afford said other individual or firm all reasonable facilities for doing such work. Other than for an extension of time, the Contractor shall make no claim to SU as a result of such work as is contemplated herein.

SU shall at all times have access to the Work whether it is in preparation or in progress, and the Contractor shall provide proper facilities for such access and for inspection. SU reserves the option to employ the services of a professional consultant to evaluate any phase of the Work deemed to be in the best interest of SU, but no evaluation performed shall in any way relieve the Contractor of its responsibilities under the Contract. The Contractor shall cooperate with the consultants and provide access to the Work and facilities for inspection. Should any portion of the Work or materials be found deficient or defective, the Contractor will pay the applicable fees of such consultant and be responsible for replacing the deficient or defective Work as required by the provisions stated elsewhere herein.

- **8.2.4** Any costs caused by defective or ill-timed Work shall be borne by the responsible party.
- **8.2.5** If the Contractor should destroy, damage or disturb the work of any other Contractor in or about the building or premises, the Contractor shall

immediately either replace the destroyed work and make good the damaged and disturbed work to the satisfaction of the A/E and SU, or shall reimburse the Contractor whose work has been destroyed, damaged or disturbed for the expense of replacing such work.

**8.2.6** Should a Contractor sustain any damage through any act or omission of any other Contractor having a contract with SU, or through any act or omission of a subcontractor of any such Contractor, or through any act or omission of the A/E, the Contractor shall have no claims against SU for such damage, but shall have a right of action to recover such damages from the causing party or parties, in accordance with Section 8.4.2, which is included in SU's contract with all other such Contractors and the A/E.

## 8.3 Substantial Completion

- **8.3.1** At the request of SU, and/or the A/E, the Contractor shall make a joint inspection of the Work, and if all determine that the Work is substantially completed, SU may give Notice of Substantial Completion for Beneficial Use. Such certification shall in no way relieve the Contractor of any contractual obligation or in any way relieve the Contractor from responsibility to promptly complete punch list Work.
- **8.3.2** Standard warranty period for equipment, workmanship and materials shall commence on the date of acknowledgment of substantial completion of the project or portions thereof so certified, or from the time of completion and acceptance of equipment, work or materials in question, whichever is later, unless specified to the contrary as a condition of partial acceptance.
- 8.3.3 Use and possession prior to completion: SU shall have the right to take possession of or use any completed or partially completed part of the Work. Prior to such possession or use, SU shall furnish the Contractor with an itemized list of Work remaining to be performed or corrected on such portions of the project as are to be possessed or used by SU, provided that failure to list any item of Work shall not be deemed an acceptance of any Work under the Contract. While SU has such possession or use, the Contractor, notwithstanding the provisions of Section 4.5 of this Contract entitled "Permits Laws Regulations," shall be relieved of the responsibility for the loss or damage to the Work resulting from SU possession or use. If such prior possession or use by SU delays the progress of the Work or causes additional expense to the Contractor, an equitable adjustment in the contract time of completion will be made and the Contract shall be modified in writing accordingly.

## **8.4** Contractor's Claims for Damages

- **8.4.1** Any claims made by a Contractor against SU for damages or extra costs are governed by and subject to the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1 et seq., as well as all the provisions in this Contract.
- 8.4.2 Any Contractor or A/E having, or which shall hereafter have, a contract with SU, which by its own acts, errors or omissions, damages or unnecessarily delays the Work of the Owner or other Contractors by not properly cooperating with them or by not affording them reasonably sufficient opportunity or facility to perform work as may be specified, by reason of which act, error or omission of the said Contractor, the A/E or any other Contractor shall sustain damages, including delay damages, during the progress of the Work hereunder, then and in the event, the culpable party agrees to pay all costs and expenses incurred by the damaged Contractor(s) or A/E due to any such delays and/or damages whether by settlement, compromise or arbitration and the injured Contractor or A/E shall have a right to redress enforcement in court directly against the culpable party.

In addition, the culpable party agrees to defend, indemnify and save harmless the State from all such claims and damages. Nothing contained in this paragraph shall be construed to relieve the culpable Contractor or A/E from any liability or damage sustained on account of such acts, errors or omissions caused by any acts or omissions as specified in the above paragraph, and the Contractor's exclusive remedy shall be against the culpable party.

## 8.5 SU's Right to Accelerate

**8.5.1** SU may order and direct the Contractor responsible for delay as described in Section 8.2.3 of this document or as may be apparent as a result of observation of the work, to accelerate that Contractor's Work at any particular place or places by increasing its forces, Working overtime and/or on Saturdays, Sundays, and holidays as may be required to enable others to carry on with their own work in accordance with the project progress schedule. The cost of such acceleration efforts shall be borne entirely by the responsible Contractor and shall not be billed to SU.

## 8.6 Time of Completion - Delay - Liquidated Damages

- **8.6.1** In the event the Contractor fails to complete the Work within the time stated in the Contract Documents, the Contractor may be liable to SU for Liquidated Damages as provided for in N.J.S.A. 18A:64-73 refer to Supplementary General Conditions for specific details.
- **8.6.2** It is hereby understood and mutually agreed by and between the Contractor and SU that the date of the initiation, the dates of required intermediate milestones, and the time for completion, as

specified in the Contract of the Work to be done hereunder are essential conditions of this Contract.

**8.6.3** The Contractor agrees that the Work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will ensure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and SU, that the time for the completion of the Work herein is a reasonable time.

If the Contractor shall neglect, fail or refuse to complete the Work within the time herein specified, or any proper extension thereof granted by SU, then the Contractor does hereby agree, as a part consideration for the awarding of its Contract, to pay SU the amount specified in Section 8.6.1 above, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor may be held in default after the stipulated date in the Contract for completing the Work.

- **8.6.4** The amount of liquidated damages is fixed and agreed upon by and between the Contractor and SU because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages SU would in such event sustain, and said amount is agreed to be the amount of damages which SU would sustain, and said amounts shall be retained by SU as necessary to cover projected untimely completion of the contract work due to Contractor-caused delays.
- **8.6.5** It is further agreed that time is of the essence of each and every portion of this Contract and of the Specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any Work, the new time limit fixed by such extension should be of the essence of this Contract.
- **8.6.6** The Contractor shall not be charged with liquidated damages, or any excess cost when SU determines that the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to SU.
- **8.6.7** The Contractor shall, within five (5) calendar days from the beginning of such delay, unless SU shall grant a further period of time prior to the date of final settlement of the contract, notify SU in writing of the causes of the delay. SU shall first ascertain the facts and the extent of the delay and shall notify the Contractor within a reasonable time that good cause has been shown to warrant the granting of such extension.

# 8.7 No Damage for Delay-Limitation on Claims Against the University

**8.7.1** SU shall have the right to defer the beginning or to suspend the whole or any part of the Work herein contracted to be done whenever, in the opinion of SU, it may be necessary or expedient for SU to do so.

If the Contractor is delayed in the completion of the Work by act, neglect or default of SU, of the A/E or of any of the Contractors employed by SU upon the Work; by changes ordered in the Work; by strikes, lockouts, fire, unusual delay by common carriers, unavoidable casualties or any cause beyond the Contractor's control; or by any cause which SU shall decide to justify the delay; then for all such delays and suspensions, the Contractor shall be allowed one calendar day addition to the time herein stated for each and every calendar day of such delay so caused in the completion of the Work as specified in Section 8.6 above, the same to be determined by SU, and a similar allowance of extra time will be made for such other delays as SU may find to have been caused by SU. No such extension shall be made for any one or more of such delays unless, within ten (10) calendar days after the beginning of such delay, a written request for additional time shall be filed with SU. Apart from extension of time, no payment or allowance of any kind shall be made to the Contractor as compensation for damages on account of hindrance or delay from any cause in the progress of the Work, whether such delay is avoidable or unavoidable.

- 8.7.2 The Contractor shall not be entitled to any damages or extra compensation against SU by reason of any delays in its works resulting from acts or omissions of any third parties irrespective of extension granted under the contract, including but not limited to delays caused by third parties such as the A/E, other contractors, utilities and governmental authorities.
- 8.7.3 SU shall only be required to pay claims for additional compensation for delays caused by SU itself and only to the extent required by N.J.S.A. 2A:58B-3 for delayed performance caused by SU's own negligence, bad faith, active interference or other tortious conduct, but not for delays resulting from the negligence of others including others under the contract with SU. SU shall not be liable to the Contractor for extra compensation for any period of delay when there is a concurrent delay for which SU is not responsible.

#### 8.8 Indemnification

**8.8.1** The Contractor shall assume all risk of and responsibility for, and agrees to indemnify, defend and save harmless SU, the State of New Jersey, and its employees from and against, any and all claims, demands, suits, actions, recoveries, judgment and costs of expenses in

connection therewith on account of the loss of life, property, injury or damage to the person, body or property sustained by Stockton University or third parties, resulting from the performance of the project or through the negligence of the Contractor, or through any improper or defective machinery, implements or appliances used by the Contractor or Subcontractors in the Project, or through any act or omission on the part of the Contractor or its agents, employees or servants, or Subcontractors which shall arise from or result directly or indirectly from the Work and/or materials supplied under this Contract. This indemnification obligation is not limited by, but is in addition to, the insurance obligations contained in this agreement.

**8.8.2** In any and all claims against SU or the A/E or any of their agents or employees by any employees of the Contractor or subcontractor or anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under this Section 8.8 shall not be limited in any way as to the amount or type of damages compensation or benefits payable by or for the Contractor or any subcontractor under worker's or workmen's compensation acts, disability benefit acts, or other employee benefit acts.

#### 8.9 Contract Time - Notice to Proceed

- **8.9.1** Contract time shall commence on the date of the Contractor's receipt of a written Notice to Proceed issued by SU. The Notice to Proceed will be issued by SU after SU's receipt and acceptance of properly executed Contract Documents, including performance and payment bonds. Unless otherwise ordered by SU in writing, the Contractor shall initiate its Contract Work at the site no later than 14 calendar days after its receipt of the Notice to Proceed.
- **8.9.2** Provided the contract is not terminated pursuant to Section 2.2 of the Instructions to Bidders if, in the opinion of SU, the Contractor's delay in furnishing financial responsibility and performance or payment bonds causes a delay in the issuance of the Notice to Proceed, the time to complete the Work as specified in the contract may be reduced to reflect such delay.
- **8.9.3** The Contractor shall perform no Work under this Contract until the required evidence of financial responsibility and bonds has been furnished. Thereafter, Work at other than the contract site may be undertaken. The Contractor shall perform no Work at the contract site except pursuant to a Notice to Proceed given by SU.
- **8.9.4** A Notice to Proceed may be issued by SU at its convenience. Any right of the Contractor to any adjustment because of a delay in issuing a Notice to Proceed shall be determined in accordance with Section 2.1

entitled "SU's Right to Stop Work.

# 9. ARTICLE 9 - PROJECT SCHEDULE

## 9.1 GENERAL REQUIREMENTS

- **9.1.1** The Work under this Contract will be planned, scheduled, executed, and reported pursuant to provisions of the General Conditions, Supplemental General Conditions (if any) and the specified dates in the Summary of Work.
- 9.1.2 The Contractor shall in no way be relieved of its responsibility of complying with all of the requirements of the Contract Documents, including, but not limited to, the responsibility of completing the Work within the Contract time and the responsibility of planning, scheduling, and coordinating the Work. The Contractor is required to comply with all control procedures specified herein and with any reasonable changes that may be necessary in the opinion of SU during the Contract duration.
- **9.1.3** All milestones or specific completion dates listed in these Specifications or elsewhere in the Contract Documents are considered essential to the satisfactory performance of the Contract and to the coordination of all Work on the project.

The specific completion dates listed represent the latest allowable completion dates. Earlier completion dates may be established as agreed by the Contractor and SU.

- **9.1.4** Should the Contractor plan to complete the Work earlier than any required Milestone or Completion date, SU shall not be liable to the Contractor for any costs or damages if the Contractor is unable to complete the Work before such Milestone or Completion date.
- **9.1.5** The Contractor shall provide all information and input required for the development of the schedule for the Work according to the requirements of this Article. The purpose of the project schedule shall be to:
  - a. Assure adequate planning, scheduling and reporting during execution of the Contract.
  - b. Assure coordination of the Work of the Contractor, subcontractors and suppliers.
  - c. Assist the Contractor and SU in monitoring the progress of Work and evaluating proposed changes to the Contract and project schedule.
  - d. Assist the Contractor and SU in the preparation and evaluation of the Contractor's monthly progress payments

**9.1.6** The Contractor shall involve all applicable Subcontractors in the schedule development, updating, and revisions as required.

#### 9.2 BREACH

**9.2.1** Failure of the Contractor to comply with the requirements of this Article shall constitute reason that the Contractor is failing to prosecute the Work with such diligence as will insure its completion within the Contract items shall be considered a breach of the Contract.

# 9.3 PROJECTS WITH CONSTRUCTION VALUES LESS THAN \$3,000,000.00 (PROGRESS SCHEDULE)

**9.3.1** The Work under this Contract will be planned, scheduled, executed and reported using a bar chart schedule as described below unless otherwise noted in the Supplementary General Conditions.

## **9.3.2** Schedule Requirements

- 1. Within ten (10) calendar days of the Notice to Proceed, the Contractor shall submit to A/E and SU representative for review and comment, a Progress Schedule for the construction work scope. The schedule shall provide a complete and detailed sequence of operations of the Work within the limits specified in the Contract.
  - a. The Progress Schedule diagram shall include:
  - 1. The order of the Contractor's activities including dates for start and completion.
  - 2. Conformance with and identification of the specific dates specified in the Contract Documents.
  - 3. The description of Work by activity.
  - 4. Offsite activities: The Contractor shall include in the Progress Schedule all procurement activities which lead to the delivery of long-lead materials to the site, (long-lead items are defined as those requiring more than one month between ordering and delivery to the site).

Offsite activities shall include the following:

- a. Dates of submittals, ordering, manufacturing or fabricating, and delivery of equipment and materials.
- All significant Contractor activities during the fabrication and erection/installation in a Contractor's plant or on a job site, including materials/equipment purchasing, and delivery.
- c. Contractor's Drawings and submittals to be prepared and submitted to the A/E. The Contractor shall be solely responsible for expediting the delivery of all material to be furnished by him so that construction progress is maintained according to the current

schedule for this Work.

Submittals, equipment orders and similar items are to be treated as schedule activities and shall be given appropriate activity numbers.

- 5. Delivery of SU furnished material and equipment.
- 6. Shop fabrication and delivery.
- 7. Testing of equipment and materials.
- 8. All code compliance inspections.
- b. The identity and duration of activities comprising the Progress Schedule shall meet the following criteria:
  - 1. Activity boundaries shall be easily measurable and descriptions shall be clear and concise. The beginning and end of each activity shall be readily verifiable, and progress should be quantifiable.
  - 2. Responsibility for each activity shall be identified with a single performing organization.
  - 3. Seasonal weather conditions, utility coordination, no-Work periods, expected job learning curves, and other foreseeable delays to activities shall be considered and included in the planning and scheduling of all Work.
- 2. The level of detail of the Progress Schedule shall be such that activity durations over twenty-one (21) working days shall be kept to a minimum except for non-construction activities such as shop drawing and sample submittals, fabrication and delivery of materials and equipment, delivery of equipment, concrete curing and General Conditions activities.
- 3. The Progress Schedule shall show a completion date for the project that is not later than the project's required completion date. All activity durations shall be given in calendar days. The Schedule also shall show the following for each activity:
  - a. Work of outside contractors, e.g., utilities, power, and with any separate contractor.
  - b. Description.
  - c. Estimated duration.
  - d. Planned start (by calendar date).
  - e. Planned finish (by calendar date).
  - f. Activity codes.
- 4. The schedule shall be prepared with notations to show how sequence of Work is affected by requirements for phased

- completion, Work by SU, pre-purchased materials, coordination with existing Work, limitations of continued occupancies, site restrictions, provisions for future Work, seasonal variations, environment control, and similar provisions of total project.
- 5. It is to be expressly understood and agreed by the Contractor that the Progress Schedule is an estimate to be revised from time to time as progress proceeds, and that SU does not guarantee that the Contractor can start Work activities on the start dates or complete Work activities on the finish dates shown in the initial schedule, or in an updated or revised schedule; nor does SU guarantee that the Contractor can always proceed in the sequence established by said schedule.

#### 9.3.3 REVIEW AND ACCEPTANCE PROCESS

- 1. SU representative will review and comment in writing those issues and/or concerns regarding the Contractor's Progress Schedule. The Contractor shall comply with all of the submission requirements of the Specifications as set forth above.
- 2. The Contractor shall revise and resubmit the Progress Schedule within seven (7) calendar days. SU representative will review and comment on the revised schedule.
- 3. If approved, the Progress Schedule will become the official Project Schedule and will be used to monitor progress of the Work, subject to such revisions made to the schedule as provided for herein or in the Contract Documents and to support requests for payment.
- 4. Acceptance by SU representative of the Contractor's Progress Schedule shall not relieve the Contractor of the responsibility for accomplishing the Work within every Contract required Milestone and completion date. SU representative disclaims any obligation or liability due to acceptance of the Progress Schedule.

#### 9.3.4 SCHEDULE UPDATES

- The Contractor understands and agrees that their Progress Schedule
  is intended to accurately reflect at all times the status of the
  construction project. The Contractor also understands and agrees
  that updating the schedule is a key component of this requirement
  and will make every reasonable effort to provide current information.
- 2. Separate update meetings will be held to report schedule progress and to review the Contractor's application for progress payment.

- 3. SU representative will not be obligated to review or to process an application for progress payment until the Contractor has submitted an updated Progress Schedule and percentages of completion are agreed to by SU representative, A/E and Contractor.
- 4. Specific dates for updates shall be agreed and established by SU representative, A/E, and Contractor but, shall be at a minimum, monthly. These updates shall be coordinated with the Contractor's application for payment date.

## 9.3.5 SCHEDULE REVISIONS

- 1. The Contractor understands and agrees that their Progress Schedule is intended to accurately reflect at all times the status of the construction project. The Contractor also understands and agrees that updating the schedule is a key component of this requirement and will make every reasonable effort so that the schedule accurately reflects current conditions.
- 2. Should the Contractor after approval of the initial Progress Schedule want to change the plan of construction, he shall submit the requested revisions to SU representative including a description of the logic for rescheduling the Work, methods of maintaining adherence to intermediate Milestones and specific dates and the reasons for the revisions. If the requested changes are accepted by SU, they will be incorporated by the Contractor into the Progress Schedule in the next reporting period.
- 3. If SU representative orders changes by Change Order that impact the Contract Milestones or specific dates stipulated, a Network showing the impact will be prepared by the Contractor and provided to SU. After SU accepts the Network, it will be incorporated into the Progress Schedule by the Contractor. No time extension for such changes shall be granted unless the change extends the project beyond the Contract Substantial Completion date.
- 4. If at any time during construction it appears to SU representative that the Contractor's schedule no longer represents the actual progress of the Work, SU representative will request in writing a revision to the schedule. Any out of sequence progress will be considered evidence that the schedule needs revising. The Contractor will have three (3) Working days to respond to that written request.

5. Failure to furnish any required submittal or information specified herein shall constitute a cause for withholding any part of progress payments pursuant to the General Conditions.

#### 9.3.6 RECOVERY SCHEDULE

- 1. Should any of the conditions exist, such that certain activities shown on the Contractor's Progress Schedule fall behind schedule to the extent that any of the specific dates are in jeopardy, the Contractor shall be required at no extra cost to SU to prepare and submit to SU representative a supplementary Recovery Schedule, in a form and detail to regain compliance with the current accepted Progress Schedule. The preparation of a recovery schedule shall not be grounds for a Change Order or a Time Extension.
- **2.** The Contractor shall perform the following after determination of the requirement for a Recovery Schedule:
  - a. Within three (3) calendar days, the Contractor shall submit a Recovery Schedule for review and acceptance to SU representative. The Recovery Schedule shall be prepared to similar level of detail as the Progress Schedule.
  - b. Any revisions necessary because of this review shall be resubmitted by the Contractor for acceptance within two (2) calendar days receipt of SU comments. SU accepted Recovery Schedule shall be the Schedule that the Contractor shall use in planning, organizing, directing, coordinating, performing, and executing the Work (including all activities of subcontractors, equipment vendors and suppliers) for the duration of the recovery schedule to regain compliance with the Progress Schedule.

# 9.4 PROJECTS WITH CONSTRUCTION VALUE GREATER THAN OR EQUAL TO \$3,000,000.00 (CPM SCHEDULE)

**9.4.1** The Work under this Contract will be planned, scheduled, executed and reported using the Critical Path Method (CPM).

#### 9.4.2 CPM REQUIREMENTS

1. Within fifteen (15) calendar days of the Notice to Proceed the Contractor shall submit to A/E and SU representative for review and comment, a CPM Schedule for the construction/erection Work scope. The schedule shall provide a complete and detailed sequence of operations of the Work within the limits specified in the Contract.

- a. The CPM Schedule shall include:
  - The order and interdependencies of the Contractor's activities and the major points of the interface or interrelation with the activities of others, including specific dates for completion. The following criteria shall form the basis for assembly of the logic:
    - a. What activity must be completed before a subsequent activity can be started?
    - b. What activities can be done concurrently? This includes activities with Start-To-Finish and Finish-To-Finish relationships with or without leads and lags.
    - c. What activities must be started immediately following a completed activity?
  - 2. Activities should be linked between major area separations of the project so that the individual areas do not imply complete independence. The critical path should run through all major areas, since the entire project must be completed.
  - 3. Conformance with and identification of the specific dates specified in the Contract Documents.
  - 4. The description of Work activity
  - 5. Off site activities:

Off site activities shall include the following:

- a. Dates of submittals, ordering, manufacturing or fabricating, and delivery of equipment and materials.
- b. All significant Contractor activities during the fabrication and erection/installation in a Contractor's plant or on a job site, including materials/equipment purchasing and delivery.
- c. Contractor's drawings and submittals to be prepared and submitted to the A/E. The Contractor shall be solely responsible for expediting the delivery of all material to be furnished by him so that construction progress is maintained according to the current schedule for this Work.

Submittals, equipment orders and similar items are to be treated as schedule activities and shall be given appropriate activity numbers

- 6. Delivery of SU furnished material and equipment.
- 7. Shop fabrication and delivery.
- 8. Testing of equipment and materials.
- 9. All code compliance inspections.
- b. The identity and duration of activities comprising the CPM Schedule shall meet the following criteria:
  - 1. Activity boundaries shall be easily measurable and descriptions shall be clear and concise. The beginning and end of each activity shall be readily verifiable, and progress should be quantifiable.
  - 2. Responsibility for each activity shall be identified with a single performing organization.
  - 3. Seasonal weather conditions, utility coordination, no-work periods, expected job learning curves, and other foreseeable delays to activities shall be considered and included in the planning and scheduling of all Work.
- 2. The level of detail of the CPM Schedule shall be such that activity durations over twenty-one (21) working days shall be kept to a minimum except for non-construction activities such as shop drawing and sample submittals, fabrication and delivery of materials and equipment, delivery of equipment, concrete curing and General Conditions activities.
- 3. The CPM Schedule shall show an early completion date for the project that is not later than the project's required completion date. All activity durations shall be given in calendar days. The CPM Schedule also shall show the following for each activity:
  - a. Interface with the work of outside contractors, e.g., utilities, power, and with any separate contractor
  - b. Description
  - c. Estimated duration
  - d. Early start (by calendar date)
  - e. Late start (by calendar date)
  - f. Early start (by calendar date)
  - g. Late finish date (by calendar date)
  - h. Total float available in Work days
  - i. Activity codes
  - j. The Critical Path for the project, with said path of activities being clearly and easily recognizable on the time-scaled CPM Schedule Diagram. The relationship between all non-critical activities and activities on the Critical Path shall also be clearly shown on the CPM Schedule Diagram.
  - k. The dollar value of each activity (Schedule of Values).

4. It is to be expressly understood and agreed by the Contractor that the CPM Schedule is an estimate to be revised from time to time as progress proceeds, and that SU does not guarantee that the Contractor can start work activities on the "early start" or "late start" dates or complete work activities on the "early finish" or the "late finish" dates shown in the initial schedule, or in an updated or revised schedule; nor does SU guarantee that the Contractor can always proceed in the sequence established by said schedule.

## 9.4.3 REQUIRED SUBMITTALS

The submittal of the contract scheduling documents shall include:

- 1. A plotter-generated time-scaled network diagram showing activity descriptions, durations and relationships between activities. The critical path should be easily identifiable.
- 2. The following reports:
  - a. Three (3) sorts of the standard CPM report, including as a minimum, activity numbers, descriptions, early and late start and finish dates, and total float; the report shall be sorted by Activity Number, Early Start, and Total Float.
  - b. Predecessors/successor report showing the above information plus predecessors and successors for each activity.
- 3. A computer disk containing the schedule data files. The Contractor shall develop the schedule using the Primavera scheduling system or an equivalent system. The Primavera system is preferred. SU has the right to accept or reject requests by the Contractor to use a scheduling system other than Primavera.

#### 9.4.4 REVIEW AND ACCEPTANCE

- 1. SU will review the Contractor's Schedule, including logic diagrams and computer-generated analysis. The Contractor shall comply with all of the submission requirements of the scheduling specification as set forth above entitled "Submittal." If the Contractor submits a complete package that complies with the requirements, SU will review and comment in writing.
- 2. The Contractor shall revise and resubmit the CPM Schedule within seven (7) calendar days. SU will review and comment on the revised schedule.
- 3. Within seven (7) calendar days following acceptance of the revised schedule, the Contractor shall provide two (2) originals of the CPM Schedule with Computer Reports to SU for final

review and acceptance.

- 4. Upon acceptance, the CPM Schedule will become the official Project Schedule and will be used to monitor progress of the Work, subject to such revisions made to the schedule as provided for herein or in the Contract Documents and to support requests for payment.
- 5. Acceptance by SU representative of the Contractor's CPM Schedule shall not relieve the Contractor of the responsibility for accomplishing the Work within every Contract required Milestone and Completion date. SU representative disclaims any obligation or liability due to acceptance of the CPM Schedule.
- 6. If the Contractor fails to provide the schedules within the time prescribed or revisions to the schedule within the requested time, SU representative may withhold approval of payment until the Contractor submits the required information.

#### 9.4.5 SCHEDULE UPDATES

- 1. The Contractor understands and agrees that their Progress Schedule is intended to accurately reflect at all times the status of the construction project. The Contractor also understands and agrees that updating the schedule is a key component of this requirement and will make every reasonable effort to provide current information.
- 2. Separate update meetings will be held to report schedule progress and to review the Contractor's application for progress payment. The application for progress payment is produced by the Contractor based on the Schedule of Values of the cost-loaded CPM.
- 3. SU representative will not be obligated to review or to process any application for progress payment until the Contractor has submitted an updated CPM Schedule and percentages of completion are agreed to by SU representative, A/E and Contractor.
- 4. When updating the computerized schedule, the Contractor must use the option that retains the original logic. Primavera calls this option "Retained Logic." Any option that overrides the original logic and allows activities that have started out of sequence to float to the project end date is not permitted.
- 5. Specific dates for updates shall be agreed and established by the

SU representative, A/E, and Contractor but, shall be at a minimum, monthly.

#### 9.4.6 SCHEDULE REVISIONS

- 1. The Contractor understands and agrees that their schedule is intended to accurately reflect at all times the status of the construction project. The Contractor also understands and agrees that changes or revisions to the schedule are key components of this requirement and will make every reasonable effort to provide information as quickly as possible so that the CPM Schedule accurately reflects current conditions.
- 2. Should the Contractor after approval of the initial CPM Schedule want to change the plan of construction, he shall submit the requested revisions to SU representative including a description of the logic for rescheduling the work, methods of maintaining adherence to intermediate Milestones and specific dates and the reasons for the revisions. If the requested changes are accepted by SU, they will be incorporated by the Contractor into the CPM Schedule in the next reporting period.
- 3. The Contractor shall revise the schedule to include the effect of changes, acts of God or other conditions or events that have affected the CPM Schedule. SU representative will review and either approve or reject the changes in writing to the Contractor. If the requested changes are approved, the Contractor shall incorporate the changes into the CPM Schedule in the next reporting period.
- 4. If SU representative orders changes by Change Order that impact the Contract Milestones or specific dates stipulated, a schedule showing the impact will be prepared by the Contractor and provided to SU. After SU accepts the Network, it will be incorporated into the CPM Schedule by the Contractor. No time extension for such changes shall be granted unless the change extends the project beyond the Contract Substantial Completion date.
- 5. Neither the updating or revision of the Contractor's CPM Schedule nor the submission, updating, change or revision of any report or schedule for SU's review or non-objection of any such report or schedule shall have the effect of amending or modifying in any way, the Contract Time, any Contract Completion Date, or Contract Milestone Dates or of modifying or limiting in any way Contractor's obligations under this Contract.
- 6. If at any time during construction it appears to SU representative that the Contractor's schedule no longer

represents the actual progress of the Work, SU representative will request in writing a revision to the schedule. Any out of sequence progress will be considered evidence that the schedule needs revising. The Contractor will have three (3) working days to respond to that written request.

7. Failure to furnish any required submittal or information specified herein shall constitute a cause for withholding any part of progress payments pursuant to the General Conditions.

## 9.4.7 RECOVERY SCHEDULE

- 1. Should any of the conditions exist, such that certain activities shown on the Contractor's CPM Schedule fall behind schedule to the extent that any of the specific dates are in jeopardy, the Contractor shall be required at no extra cost to SU to prepare and submit to SU representative in a addition to the Project Schedule a supplementary Recovery Schedule, in a form and detail appropriate to the need to regain compliance with the current accepted CPM Schedule during the immediate subsequent pay period. The preparation of a recovery schedule shall not be grounds for a Change Order or a Time Extension.
- 2. The Contractor shall perform the following after determination of the requirement for a Recovery Schedule:
  - a. Within three (3) calendar days, the Contractor shall submit a Recovery Schedule for review and acceptance to SU representative. The Recovery Schedule shall be prepared to similar level of detail as the CPM Schedule and shall have a maximum duration of one (1) month.
  - b. Any revisions necessary because of this review shall be resubmitted by the Contractor for acceptance within two (2) calendar days receipt of SU comments. SU accepted Recovery Schedule shall then be the Schedule that the Contractor shall use in planning, organizing, directing, coordinating, performing, and executing the Work (including all activities of subcontractors, equipment vendors and suppliers) for its one (1) month duration to regain compliance with the CPM Schedule.

#### 10. ARTICLE 10 – PAYMENTS

#### **10.1.** Contractor Payment Process

**10.1.1** Application for Payments shall be based on the approved Schedule of Values. The submission and approval of progress updates calculating the value of Work done for any given pay period for any

activity based on the percentage complete for that activity less the amount previously paid for past percentages complete and percent of retainage shall be an element of the evaluation of progress payments pursuant to the provisions of the General Conditions. An initial application for payment for expenditures not directly related to the Work accomplished at the project will be allowed before the acceptance of the Contractor's Progress Schedule. Requests for payment for Work items not included above may be denied without an approved schedule.

**10.1.2** SU may make progress payments monthly as the Work proceeds, or at more frequent intervals as determined by SU, on estimates approved by of amounts for contract payments of the total contract price, showing the amount included therein for each principal category of the Work, in such detail as requested, to provide a basis for determining progress payments.

The schedule, as approved, shall be used only as a basis for the Contractor's estimates for progress payments, and approval by SU does not constitute acceptance of the allowability of costs to a specific element of Work. The Contractor is cautioned that no payment requests shall be approved until the Schedule of Values, (SOV) has been approved in writing by SU's authorized representative.

10.1.3 If a contractor has performed in accordance with the provisions of a contract with SU and the billing for the Work has been approved and certified by SU's authorized representative SU shall pay the amount due to the contractor for each periodic payment, final payment or retainage monies not more than 30 calendar days after the billing date, which for a periodic billing, shall be the periodic billing date specified in the contract. The billing shall be deemed approved and certified 20 days after the appropriate SU construction accounting office receives it unless SU's authorized representative provides, before the end of the 20-day period, a written statement of the amount withheld and the reason for withholding payment. If a subcontractor or sub subcontractor has performed in accordance with the provisions of its contract with the contractor or subcontractor and the Work has been accepted by SU's authorized representative, as applicable, and the parties have not otherwise agreed in writing, the contractor shall pay to its subcontractor and the subcontractor shall pay to its sub subcontractor within 10 calendar days of the receipt of each periodic payment, final payment or receipt of retainage monies, the full amount received for the Work of the subcontractor or sub subcontractor based on the Work completed or the services rendered under the applicable contract. In the case of ongoing Work on the same project

for which partial payments are made, the amount of money owed for Work already completed shall only be payable if the subcontractor or sub subcontractor is performing to the satisfaction of the contractor or subcontractor, as applicable.

- **10.1.4** In the preparation of estimates, SU has the discretion to authorize material delivered on the site and preparatory Work done to be taken into consideration. Material delivered to the Contractor at locations other than the site may also be taken into consideration if (a) such consideration is specifically authorized by the contract and (b) the Contractor furnishes the properly completed forms provided by SU related to the storage of materials.
- **10.1.5** In making such progress payments for contract Work completed, SU will retain 2% of the invoice amount as cash retainage unless the Contractor provides a Retainage Bond or "eligible collateral" as provided by Section 10.5 below.
- **10.1.6** All material and work covered by progress payments made shall thereupon become the sole property of the University, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of all materials and work upon which payments have been made or the restoration of any damaged work, or as waiving the right of the University to require the fulfillment of all of the terms and conditions of the Contract.
- 10.1.7 If performance and payment bonds are required under this contract, the University shall pay to the Contractor the total premiums paid by the Contractor to obtain the bonds. This payment shall be paid at one time to the Contractor together with the first progress payment otherwise due after the Contractor has (1) furnished the bonds (including coinsurance and reinsurance agreements, when applicable), (2) furnished evidence of full payment to the surety company, and (3) submitted a request for such payment. The payment by the University of the bond premiums to the Contractor shall not be made as increments of the individual progress payments and shall not be in addition to the contract price.
- 10.1.8 In addition to other warranties required by provisions of the contract and Specifications, the Contractor warrants that title to all Work, materials and equipment covered by an application for payment will pass to SU, either upon incorporation into the construction or upon receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests or encumbrances. This provision shall not be construed as relieving the Contractor from sole responsibility for the care and protection of materials and Work upon which payments have been made, or for the restoration of any damaged Work,

or as a waiver by SU of its rights to require fulfillment of all terms of the contract.

**10.1.9** Recommendation for approval of an invoice will constitute a representation by the A/E to SU, based on inspections at the site and data contained in the invoice, that the Work has progressed to the point indicated; that, to the best of the A/E's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents; and that the Contractor is entitled to payment in the amount certified.

By recommending approval of the invoice, however, the A/E shall not thereby be deemed to represent that it has made exhaustive or continuous on- site inspections to check the quality or quantity of the Work, or that it has reviewed the construction means, methods, techniques, sequences or procedures, or that it has made any examination to ascertain how and for what purpose the Contractor has used the moneys previously paid on account of the contract sum.

- **10.1.10** No payment for Work will be approved until the Contractor has complied with the provisions of this Article.
- **10.1.11** If any corporation licensed to do business in New Jersey shall be of delinquent in the payment of taxes due the State, unless under an active appeal process, SU may withhold moneys due the said corporation for the purpose of assuring the payment to the State of such taxes.

#### 10.2 Invoices

- **10.2.1** Requests for payment under the contract for materials delivered or services rendered require the proper completion and submittal of specific forms to be provided by SU.
- 10.2.2 The Contractor shall submit the completed request for payment packet to SU project representative once monthly. The Contractor shall submit a pencil copy for review by SU by the 20<sup>th</sup> of each month. The Contractor is to complete the payment application based on the projected completed work for the end of the pay period. Receipt of a properly completed request for payment packet will start the prompt payment clock, upon receipt at the Office of Facilities Planning and Construction, unless it is subsequently discovered to be incomplete or otherwise unacceptable and returned to the Contractor within 20 calendar days for correction. A properly completed request for payment shall be paid not more than 30 calendar days from date time-stamped by the Office of Facilities Planning & Construction.

- **10.2.3** Request for payment packets shall be prepared and submitted in original plus two copies unless otherwise specified.
- **10.2.4** For purpose of determining if interest begins to accrue under the State's Prompt Construction Payment Act, (NJSA 2A:30A-1 et seq.)
  - a A proper invoice will be deemed to have been received when it is time- stamped by the Office of Facilities Planning & Construction and acceptance of the materials delivered or services rendered has occurred;
  - b. Payment shall be considered made on the date on which a check for such payment is dated;
  - c. Payment terms offered by the Contractor will not be recognized by SU as a "required payment date.

#### 10.3 Interest

- **10.3.1** Interest shall be paid on the amount due the Contractor pursuant to a properly executed SU invoice (see preceding Section 10.2) if the required payment is not made on or before the required payment date.
- 10.3.2 The required payment date shall be 30 calendar days from the receipt of a properly executed SU invoice or 30 calendar days from receipt of supplies or services, whichever is later from the Contractor.
- **10.3.3** Interest on amounts due shall be paid to the Contractor in accordance with the Prompt Construction Payment Act (NJSA 2A:30A-2).

#### 10.4 Allowances

10.4.1 The Contractor shall include in its bid all allowances as may be set forth in the Contract Documents. The Contractor shall purchase the "allowed materials" as directed by SU on the basis of the lowest acceptable quote from at least three competitive offers. If the actual cost of the "allowed materials" is more or less than the stipulated allowance, the contract price shall be adjusted accordingly. The adjustment in contract price shall be made on the basis of the actual purchase cost without additional charges for overhead, profit, bond premium or any other incidental expenses. The cost of installation of the "allowed materials," unless otherwise specified, is to be included as the responsibility of the Contractor in whose contract the allowance is included, and the Contractor installing such "allowed materials shall not be entitled to additional payment for such installation.

Unless otherwise provided in the Contract Documents:

a. These allowances shall cover the Contractor's true costs, including credit for any trade discount, of the materials and equipment required by the allowance, delivered at the site,

## including all applicable taxes;

- b. The Contractor's costs for unloading and handling, labor, installation costs, overhead, profit and other expenses reasonably required in connection with such allowance items shall be included in the contract sum and not as part of the allowances; and
- c. Should the actual cost vary from the allowance, the contract sum shall be adjusted accordingly by change order, the amount of which will recognize changes, if any, of handling costs on the site, labor, installation costs, overhead, profit and other expenses resulting to the Contractor from any change in quantity only (not price) beyond that contemplated by the allowance.

# 10.5 Retainage, Retainage Bond or Other Security for Retainage Amount.

- 10.5.1 SU shall withhold retainage from each progress payment in the amount of 2% of the approved billing, unless the Contractor posts a retainage bond with SU or deposits bonds or notes ("Eligible Collateral") as provided below, in an amount equal to 2% of the total contract value. The cash retainage, retainage bond or eligible collateral will be held by SU until final completion and acceptance of the Work by the University.
- 10.5.2 Retainage Bond: If the Contractor decides to submit a a Retainage Bond in lieu of having retainage withheld from each progress payment, the Contractor shall submit the original bond to SU in the amount of 2% of the contract upon signing the contract and before starting the Work. SU shall approve the bond form and shall be named as the insured on the bond. If any change order results in an increase in the contract price, the contractor shall increase the face amount of the retainage bond by 2% of the amount of the Change Order.

## **10.5.3** Deposit of Eligible Collateral in lieu of Retainage:

If the contractor seeks to have the retainage amount secured by eligible collateral, the contractor shall notify the University of that intention in its bid, and shall submit a detailed list, description and valuation of the bonds or notes proposed as collateral to SU within 5 days of the Contractor's receipt of notice of SU's intent to award the contract to the Contractor. The eligible collateral proposed by the Contractor must meet the definition of "eligible collateral" in N.J.A.C. 3:34-1.2, and must be valued in an amount not less than 2% of the total contract amount. The acceptance of any eligible collateral in lieu of retainage or a retainage bond shall be approved by the University at the time the contract is executed. The Contractor will be required to execute a Custodial Account Control Agreement ("CAC Agreement") in a form satisfactory to SU with a

financial institution located within this State which has been approved as a "public depository" by the N.J. Department of Banking. Within five business days of execution of the Contract and the CAC Agreement, the Contractor shall deposit the approved eligible collateral into the Custodial Account bearing interest at the rate currently paid by such institutions or associations on time or savings accounts. If any change order results in an increase in the total contract price, or in the event of a reduction in the value of the collateral as provided in the CAC Agreement, the contractor shall deposit into the Custodial Account additional eligible collateral to assure that the total value of the eligible collateral in the Custodial Account is maintained at not less than 2% of the total contract amount, including all approved change orders.

## 10.6 Release of Retainage after Final Acceptance of the Work.

- 10.6.1 Upon final completion and acceptance of the Work by SU, satisfactory completion, by the Contractor, of all contract close-out requirements, completion of a University audit on all contract values and payments, and after the Contractor shall have furnished the University with a release of claims against the University, arising by virtue of this contract, other than claims in stated amounts as may be specifically excepted by the Contractor from the release, the Contractor shall submit a properly executed invoice for final payment to SU project representative who will initiate the process of final payment review and approval. It is agreed by SU and the Contractor that the final acceptance date shall be the date the final payment application is received and time-stamped by the Office of Facilities Planning & Construction unless the final payment application is subsequently discovered to be incomplete or otherwise unacceptable and returned to the Contractor within 20 calendar days for correction.
- **10.6.2** All amounts of retainage withheld by SU under Section 10.5, less deductions or credits authorized by the final payment application or as provided by Section 10.6.5 below, shall be disbursed to the Contractor within 30 days of the final acceptance date.
- **10.6.3** If the Contractor has posted a retainage bond under Section 10.5, the bond, less deductions or credits authorized by the final payment application or as provided by Section 10.6.5 below, shall be released by SU within 30 days of the final acceptance date.
- **10.6.4** If the Contractor has entered into a CAC Agreement with SU under Section 10.5, the collateral deposited therein, and any interest accrued on such collateral or on the account, less deductions or credits authorized by the final payment application or as provided by Section 10.6.5 below, shall be returned to the

- contractor within 30 days of the final acceptance date, unless otherwise specified in the CAC Agreement.
- 10.6.5 If any Contractor licensed to do business in New Jersey shall be or become delinquent in the payment of taxes due the State, unless under an active appeal process, SU may withhold moneys due the Contractor for the purpose of assuring the payment to the State of such taxes.
- 10.6.6 If for any reason the Contractor refuses final payment, the project shall be closed out by SU by the processing of a Final Invoice. All residual funds will be held in escrow by SU until all claims of SU and all Contractors are satisfied.

#### 11. ARTICLE 11 -- UNCOVERING AND CORRECTION OF WORK

#### 11.1 Uncovering of Work

**11.1.1** If any portion of the Work is covered prior to inspection by SU or the A/E, especially Work specifically required by the Contract Documents to be inspected, it shall be uncovered for observation.

Uncovering the replacement of covering shall be at the installation Contractor's expense. The Contractor is obligated to advise SU or the A/E of all Work scheduled to be covered which is reasonably subject to prior inspection before actual covering.

11.1.2 If any other portion of the Work not specifically required to be inspected has been covered, which SU or the A/E did not request to observe prior to being covered, a request may subsequently be made to inspect such Work, and it shall be uncovered by the installation Contractor. If such

Work is found to be in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate change order, be reimbursed by SU. If such Work is found not to be in accordance with the Contract Documents, the Contractor shall pay all associated costs, unless it is found that this condition was caused by SU, in which event SU shall be responsible for the payment of such costs.

## 11.2 Correction of Work

- 11.2.1 The Contractor shall promptly correct all Work rejected by SU or the A/E as defective or failing to conform to the Contract Documents, whether observed before or after final acceptance and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such rejected Work, including the A/E's additional services, if any.
- 11.2.2 The Contractor shall remove from the site all portions of the Work which are defective or non-conforming and which have not been corrected, unless removal is waived by SU.
- 11.2.3 If the Contractor fails to correct defective or non-conforming Work in a

timely manner, SU may make arrangements for such correction by others and charge the cost of so doing to the responsible Contractor and/or its sureties.

11.2.4 If the Contractor does not proceed with the correction of such defective or non-conforming Work within 72 hours, fixed by written notice from SU or the A/E, SU may cause the removal and correction of the Work and may store the materials or equipment at the expense of the Contractor. If the Contractor does not pay for the cost of such removal and storage within 14 calendar days thereafter, SU may, upon 14 calendar days additional written notice, sell such material and equipment at auction or at private sale and shall account for the net proceeds thereof, after deducting all of the costs which are the responsibility of the Contractor, including compensation for the A/E's additional services, if any.

If such proceeds of sale do not cover all costs which the Contractor should have borne, the difference shall be charged to the Contractor and an appropriate credit change order shall be issued. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor and/or its surety shall pay the difference to SU.

- 11.2.5 The Contractor shall be responsible for the cost of making good all Work destroyed or damaged by such correction or removal.
- 11.2.6 Nothing contained herein shall be construed to establish a period of limitation, with respect to any other obligation which the Contractor might have under the Contract Documents.

## 11.3 Acceptance of Defective or Non-Conforming Work

11.3.1 SU may determine that the best interests of SU will be served by accepting defective or non-conforming Work instead of requiring its removal and correction. In such instance a change order will be issued to reflect an appropriate and equitable and reduction in the contract sum. Such adjustment shall be effected regardless of final payment having previously been made, and the Contractor and/or its surety shall be responsible for promptly providing any funds due SU as a result thereof.

## 12. ARTICLE 12 -- PROTECTION OF PERSONS AND PROPERTY

## 12.1 Safety Precautions and Programs

12.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. It is the responsibility of the Contractor to maintain total control of safety to ensure that its employees, its subcontractors, occupants, and the general public will be provided an environment free of recognized hazards during construction and renovation activities. Prior to

the start of the work, the Contractor shall provide a Site Specific Safety Plan to SU within 14 calendar days after issuance of Notice to Proceed so the plan can be reviewed. The Contractor shall require that all subcontractors of any tier comply with the Site Specific Safety Plan provided by the Contractor. The Contractor shall assume all costs related to, but not limited to, personal protective equipment, training, or compliance requirements. Failure to include the cost of complying with all applicable laws, ordinances, rules, or regulations by authorities having jurisdiction will not relieve the Contractor from the obligation to implement these requirements.

Contractor shall designate a responsible member of its 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 SU and the A/E.

## 12.2 Safety of Persons and Property

- **12.2.1** Contractor shall take all reasonable precautions for the safety and security of, and shall provide all reasonable protection to prevent damage, injury or loss to:
  - a. Every employee on the Work and all other persons who may be affected thereby;
  - b. All the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor, or any of its subcontractors or subsubcontractors; and
  - **c.** Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- **12.2.2** The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.
- 12.2.3 The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including, but not limited to, rails, night-lights, the posting of danger signs and other warnings against hazards, promulgating safety regulations, notifying owners and users of adjacent utilities and other means of protection against accidental injury or damage to persons and property.
- **12.2.4** When the use of hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified

personnel. Storage of hazardous materials shall be placed in storage of approved containers for that specific material and Contractor shall provide to SU the M.S.D.S. for all hazardous materials.

- **12.2.5** No Contractor shall load or permit any part of the Work to be loaded so as to endanger its safety.
- 12.2.6 The Contractor shall promptly remedy all damage or loss to any property caused in whole or in part by the Contractor, any of its subcontractors, subsubcontractors, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable and for which the Contractor is responsible, except damage or loss attributable to the acts or omissions of SU or A/E, 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 its obligations stated elsewhere herein.

The Contractor shall provide all necessary means to make weather-tight any opening, access or any area that will cause or have the potential to cause any type of weather from entering into the building.

The Contractor shall provide weather-tight materials to protect all interior equipment, devices, or contents. The Contractor shall be responsible for any damages to the building, equipment, devices, or contents of the Owner as a result of weather entering into the building.

For those conditions where life and health safety warrants an immediate response and/or repairs, the contractor shall address the matter(s) accordingly with due diligence.

#### 12.3 Construction Safety Act

In order to protect the lives and health of the employees working under the Contract, the Contractor shall comply with all pertinent provisions of the "Contract Work Hours and Safety Standards Act" (N.J.S.A. 34:5-166, et seq.), as amended, commonly known as the "Construction Safety Act", as it pertains to health and safety standards; and shall maintain an accurate record of all cases of death, occupational disease and injury requiring medical attention or causing loss of time from work arising out of or in the course of employment on the work under the Contract.

In addition, Contractor and all its subcontractors shall comply with O.S.H.A, SU Safety Manual and any applicable local codes and ordinances.

## 12.4 Emergencies

**12.4.1** In any emergency affecting the safety of persons or property, the Contractor shall act with diligence, at its discretion, to prevent threatening injury, damage or loss.

In such case, the Contractor shall immediately notify SU Campus Police, SU representative, and Office of Facilities Planning & Construction of the action taken and shall forthwith prepare and submit a detailed report of said action.

- **12.4.2** Wherever the Contractor has taken no action, but has notified SU or wherever SU has otherwise been made aware of any emergency threatening injury to persons, or loss or damage to Work or adjacent property, the Contractor shall act only as instructed or authorized by SU.
- **12.4.3** Prior to commencement of the Work, Contractor shall provide SU with the names and contact information for Contractor's employees and subcontractors who are available 24 hours, seven days a week, in case of emergency.

# 13. ARTICLE 13 -- INSURANCE AND INDEMNITY AND BOND REQUIREMENTS 13.1 Contractor Insurance Requirements

13.1.1 The Contractor shall secure and maintain in force for the term of the Contract, insurance coverage provided herein. All insurance coverage is subject to the approval of SU and shall be issued by an insurance company authorized to do business in the State of New Jersey and which maintains an A.M. Best rating of A- (VII) or better. The Contractor shall provide SU with current Certificates of Insurance for all coverage and renewals thereof which must contain the provision that the insurance provided in the certificate shall not be canceled for any reason except after thirty (30) days written notice to SU.

All insurance required herein shall contain a waiver of subrogation in favor of SU. Commercial General Liability insurance, Comprehensive Automobile Liability and Excess Liability umbrella form insurance, required herein, shall name SU, the State of New Jersey, the New Jersey Educational Facilities Authority, the Architect/Engineer and Construction Manager as additional insured's.

13.1.2 Commercial General Liability insurance written on an occurrence form including independent contractor liability, product/completed operations liability, contractual liability, covering but not limited to the liability assumed under the indemnification provisions of this Contract. Coverage for bodily injury and property damage claims arising out of the professional acts of the general contractor and subcontractors shall also be included. The policy shall not include any endorsement that restricts or reduces coverage as provide by the ISO CG0001 form without the approval of SU.

The minimum limits of liability shall not be less than a combined single limit of one million dollars (\$1,000,000) per occurrence, three million dollars (\$3,000,000) general aggregate, three million dollars (\$3,000,000)

product/completed operations aggregate. A "per project endorsement" shall be included, so that the general aggregate limit applies separately to the project that is the subject of this Contract.

- 13.1.3 Comprehensive Automobile Liability covering owned, non-owned, and hired vehicles. The limits of liability shall not be less than a combined single limit of one million dollars (\$1,000,000) per occurrence.
- 13.1.4 Worker's Compensation Insurance applicable to the laws of the State of New Jersey and other State or Federal jurisdiction required to protect the employees of the Contractor and any Subcontractor who will be engaged in the performance of this Contract. The certificate must also indicate that no proprietor, partner, executive officer or member is excluded.

This insurance shall include Employers' Liability Protection with a limit of liability not less than one million dollars (\$1,000,000) bodily injury, each occurrence, one million dollars (\$1,000,000) disease, each employer, and one million dollars (\$1,000,000) disease, aggregate limit. Including the employer's liability insurance under the umbrella insurance can satisfy the limit requirements.

- 13.1.5 The Contractor shall obtain and maintain a separate Owners and Contractor's Protective Liability Insurance Policy for the same limits of liability as specified for the Commercial General Liability Insurance in the name of SU, the State of New Jersey and the New Jersey Educational Facilities Authority. The Architect/Engineer, and the Construction Manager are to be the named as additional insured. The policy shall be maintained in force for the term of the Project or one year, whichever is longer.
  - **13.1.6** Excess Liability, umbrella insurance form, applying excess of primary to the commercial general liability, commercial automobile liability and employer's liability insurance shall be provided with minimum limits of ten million dollars (\$10,000,000) per occurrence, ten million dollars (\$10,000,000) general aggregate, and ten million dollars (\$10,000,000) products/completed operations.
- 13.1.7 The contractor shall be responsible for obtaining Certificates of Insurance for all coverages described in 13.1.2 and 13.1.4 and renewals thereof for each subcontractor and their sub-tier subcontractors prior to the subcontractor's beginning Work on the Project. The contractor shall not require subcontractors or their sub-tier subcontractors to comply with paragraph 13.1.5, Owners and Contractors Protective Liability Policy or paragraph 13.1.6, Excess Liability, umbrella form.

The contractor shall provide copies of all subcontractor and their sub-tier subcontractors' certificates of insurance to the University upon request.

### 13.2 Insurance To Be Carried By Stockton University

- 13.2.1 SU shall provide; insurance protection in the form of a Builders Risk Insurance or similar Policy upon the structure for which the Work on this Contract is to be done. The structure will be insured for 100% of the insurable replacement value thereof including materials, owned by SU, in place or to be used as part of the permanent construction including surplus materials.
- 13.2. 2 This insurance shall not protect against damage or loss to any of the Contractor's or Subcontractor's tools, equipment, scaffolding, staging towers or forms, Contractor's materials and sheds or other temporary structures erected for used by the Contractor or Subcontractors. It is understood that the Contractor will, at their own expense, carry all insurance which may be required to provide the necessary protection against such loss or damage herein described which insurance shall contain a waiver of any right of subrogation against SU.
- **13.2.3** The insurance procured by SU under this paragraph may provide for a deductible. SU shall be responsible for payment of any deductible for any builder's risk loss it may make claim for under this policy.
- 13.2.4 The Contractor shall immediately notify SU in writing and take any other appropriate steps as may be required under the standard Builder's Risk Insurance Policy in effect in the event of any loss. Prior to the acceptance of the building by SU, the Contractor shall, at SU 's option, replace and repair the damaged Work as originally provided in the Drawings and Specifications at no additional compensation to that provided in the original contract.
- 13.2.5 All losses will be adjusted with, and payable to, SU.
- 13.2.6 Builders Risk insurance protection as described herein shall not relieve the Contractor from its obligation to complete, according to Plans and Specifications, the project covered by the contract, and the Contractor and their Surety shall be obligated to full performance of the Contractor's undertaking.

#### 13.3 Performance and Payment Bond

13.3.1 The successful bidder shall furnish, within ten (10) calendar days after the intent to award letter, both a performance bond substantially in the statutory form NJSA 2A:44-147 in an amount equal to one hundred percent (100%) of the total contract price as security for the faithful performance of this contract and a payment bond in statutory form in amount equal to one hundred percent (100%) of the contract price as security for the payment of all persons and firms performing labor and furnishing materials in connection with this contract. The performance bond and the payment bond may be combined or in separate instruments in accordance with law. No contract shall be executed unless and until each bond is submitted to

and approved by SU. The surety must be presently authorized to do business in the State of New Jersey.

- **13.3.2** The cost of bonds shall be paid for by the Contractor.
- 13.3.3 If at any time SU, for justifiable cause, is dissatisfied with any surety which has issued or proposes to issue a performance or payment bond, the contractor shall, within ten (10) calendar days after notice from SU to do so, substitute an acceptance bond (or bonds). The substituted bond(s) shall be in such form and sum and executed by such other surety or sureties as may be satisfactory to SU. The premiums on such bond(s) shall be paid by the contractor.
- 13.3.4 No contract shall be executed and/or no payment made under a contract until the new surety or sureties shall have furnished such an acceptable bond to SU.
- 13.3.5 Bonds must be legally effective as of the date the contract is signed. Each must indicate the contractor's name exactly as it appears on the contract.

Current attorney-in-fact instruments and financial statement of the surety must be included with the bonds. Bonds must be executed by an authorized officer of the surety. Bonds furnished under this section shall be issued by a surety that meets the standards set forth in NJSA 18A: 64-68 et seq. including the requirement that the surety shall hold a current certificate of authority issued by the United States Secretary of Treasury, pursuant to 31 <u>U.S.C.</u> section 9305, that is valid in the State of New Jersey as listed annually in the United States Treasury Circular 570.

13.3.6 The Payment and Performance Bond shall be accompanied by a completed "Surety Disclosure Statement and Certification" substantially in the form prescribed in N.J.S.A. 18A:64-68 (e) and executed by the authorized representative for the Surety.

(The "Surety Disclosure Statement and Certification" form is attached as an exhibit to the Instruction to Bidders).

#### 14. ARTICLE 14 -- CHANGES IN THE WORK

#### 14.1 Changes to Contract

- **14.1.1** SU may at any time, by written order designated or indicated to be a change order, make any change in the Work within the general scope of the contract, including, but not limited to, changes:
  - a. In the Specifications (including Drawings and designs);
  - b. In the method or manner of performance of the Work;
  - c. In SU-furnished facilities, equipment, materials, services, or site; or
  - d. Directing acceleration in the performance of the Work.

#### 14.2 Requests for Equitable Adjustment

- 14.2.1 The Contractor agrees to prepare and submit, within 20 calendar days of encountering any conditions it considers a change, or upon receiving official notice of a proposed change or written direction to proceed with a change, a current SU form entitled "Contractor Change Order Request" to SU's designated project representative. An original and two (2) copies shall be submitted.
- 14.2.2 All requests for contract time extensions must be in writing accompanied by copies of the current (approved) progress schedule and copies of the revised (proposed) progress schedule detailing the incorporation of the changed Work and the effects of such incorporation on progress. Failure to provide the schedule data shall be grounds for rejection of the request.
- 14.2.3 Notwithstanding any other portion of this Contract, any time extensions for changes in the Work depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The contract modification making such time extension will provide for an extension of contract completion date only for those specific elements so delayed, and will not alter the contract completion dates for other portions of the Work. This Contract modification may further provide for an equitable readjustment of liquidated damages pursuant to the new completion schedule.
- 14.2.4 The Contractor, in connection with any request it makes for an equitable adjustment, shall furnish a price breakdown, itemized as required by SU. Unless otherwise directed, the breakdown shall cover all Work involved in the change whether such Work was deleted, added or changed. Further, the breakdown shall be in sufficient detail to permit an analysis of all costs, as well as overhead and profit.

Any amount proposed for subcontracts shall be supported by a similar price breakdown. In addition, if the request includes a time extension, a justification (see Section 14.2.2) shall also be furnished. The request,

- together with the price breakdown and time extension justification, shall be furnished by the date specified.
- 14.2.5 If any change under this article causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the Work under this Contract, whether or not changed by any such order, an equitable adjustment may be made in the contract price or delivery schedule or both, and the contract modified in writing accordingly.
- **14.2.6** When the contract time is increased as a result of a change, the resulting change in contract amount will include the cost of extended performance, computed in accordance with the terms of this article.
- 14.2.7 The following guidelines shall apply in computing overhead and profit for the negotiation of equitable adjustments; under all provisions of this Contract the guidelines shall be applicable for deleted Work as well as additional Work. When a change consists of both added and deleted Work, the applicable guideline shall be applied to the net cost or credit. In any event, the following guidelines shall apply to all requests for an equitable adjustment:
  - Overhead will be the sum of:
    10 percent (10%) of costs as defined in Section 1.1.11. Note:
    Costs for supervision and field office personnel (including superintendents and labor foreman) are only paid as part of the Overhead calculation. The calculation of Overhead for the Contractor for Work performed by subcontractors shall be based on their actual costs, before overhead and profit
  - b. For rented equipment, the standard rates listed in the current edition of the Rental Rate Blue Book for Construction Equipment shall be used to determine the rental rate. Rentals will be paid on a daily, weekly or the monthly rate stated, depending on which rate is most economical for SU. The Contractor will be allowed only 65 percent (65%) of the rental rate on Contractor-owned equipment.
  - c. Bond premiums & insurance, if applicable, will be allowed at actual cost for the equitable adjustment allowed and no overhead or profit permitted.

#### 14.2.8 Contractor's Profit

- a. The prime Contractors profit on work performed with its own forces will be five Percent (5%) of costs, bond premiums and insurance excluded.
- b. The prime Contractor's profit on the subcontractor's Work will be five percent (5%) of the subcontractor's costs. The

Contractor agrees to incorporate this article in each of its subcontracts.

14.2.9 The SU, in order to avoid delays in the progress of Work or when in the best interests of SU, has the discretion to direct the Contractor, in writing, to proceed with a change without a prior agreement on costs. Such direction shall be in the form of an un-priced change order or letter of direction.

If the Contractor intends to assert a request for an equitable adjustment under this article, the Contractor must submit to SU's designated project representative an SU supplied form completed in sufficient detail and in accordance with this article within 20 calendar days after receipt of an un-priced change order or letter of direction.

- **14.2.10** Where the cost of property made obsolete or excess as a result of a change is included in the Contractor's request for adjustment, SU shall have the right to prescribe the manner of disposition of such property.
- **14.2.11** Failure to agree to any adjustment shall be a dispute concerning a question of fact within the meaning of section 2.4 of this document. However, nothing in this article shall excuse the Contractor from proceeding with the contract as changed.

#### 15. ARTICLE 15 -- ASSIGNMENT OF ANTITRUST CLAIM(S)

#### **15.1** Assignment of Antitrust Claim(s)

**15.1.1** The Contractor recognizes that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the ultimate purchaser. Therefore, and as consideration for executing

this Contract, the Contractor, acting herein by and through its duly authorized agent, hereby conveys, sells, assigns, and transfers to SU of New Jersey, for itself and on behalf of its political subdivisions and public agencies, all right, title and interest to all claims and causes of action it may now or hereafter acquire under the antitrust laws of the United States or the State of New Jersey, relating to the particular goods or services purchased or acquired by the State of New Jersey or any of its political subdivisions or public agencies pursuant to this Contract.

- In connection with this assignment, the following are the express obligations of the Contractor:
- a. It will take no action which will in any way diminish the value of the rights conveyed or assigned hereunder.
- b. It will advise the Attorney General of New Jersey:
  - a. In advance of its intention to commence any action on its

own behalf regarding any such claim or cause(s) of action;

- b. Immediately upon becoming aware of the fact that an action has been commenced on its behalf by some other person(s) of the tendency of such action.
- c. It will notify the defendants in any antitrust suit of the fact of the within assignment at the earliest practicable opportunity after the Contractor has initiated an action on its own behalf or becomes aware that such an action has been filed on its behalf by another person. A copy of such notice will be sent to the Attorney General of New Jersey.

Furthermore, it is understood and agreed that in the event any payment under any such claim or cause of action is made to the Contractor, it shall promptly pay over to the State of New Jersey the allotted share thereof, if any, assigned to the State hereunder.

#### 16. ARTICLE 16 -- AFFIRMATIVE ACTION REQUIREMENTS

#### **16.1** Policy Statement

The laws of New Jersey (N.J.S.A. 10:5-31 et seq.) provide that no public Works Contractor can be awarded nor any moneys paid until the prospective Contractor has agreed to contract performance which complies with the approved Affirmative Action Plan. The law applies to each political subdivision and agency of the State and includes procurement and service contracts, as well as construction contracts. This section was prepared to explain the affirmative action requirements and procedures for public agencies awarding contracts and for Contractors bidding on contracts.

To assure effective application of the affirmative action law while allowing the business operations of government to proceed efficiently, these regulations (see N.J.A.C. 17:27) are designed to minimize administrative paperwork and delays.

#### 16.2 Mandatory Language

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

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity 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 con- tractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable 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 age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bar- gaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer, pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

When hiring or scheduling workers in each construction trade, the contractor or subcontractor agrees to make good faith efforts to employ minority and women workers in each construction trade consistent with the targeted employment goal prescribed by N.J.A.C. 17:27-7.2; provided, however, that the Dept. of LWD, Construction EEO Monitoring Program, may, in its discretion, exempt a contractor or subcontractor from compliance with the good faith procedures prescribed by the following provisions, A, B, and C, as long as the Dept. of LWD, Construction EEO Monitoring Program is satisfied that the contractor or subcontractor is employing workers provided by a union which provides evidence, in accordance with standards prescribed by the Dept. of LWD, Construction EEO Monitoring Program, that its percentage of active "card carrying" members who are minority and women workers is equal to or greater than the targeted employment goal established in accordance with N.J.A.C. 17:27-7.2. The contractor or subcontractor agrees that a good faith effort shall include compliance with the following procedures:

(A) If the contractor or subcontractor has a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor shall, within three business days of the contract award, seek assurances from the union that it will cooperate with the contractor or sub- contractor as it fulfills its affirmative action obligations under this contract and in

accordance with the rules promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et. seq., as supplemented and amended from time to time and the Americans with Disabilities Act. If the contractor or subcontractor is unable to obtain said assurances from the construction trade union at least five business days prior to the commencement of construction work, the contractor or sub- contractor agrees to afford equal employment opportunities minority and women workers directly, consistent with this chapter. If the contractor's or subcontractor's prior experience with a construction trade union, regardless of whether the union has provided said assurances, indicates a significant possibility that the trade union will not refer sufficient minority and women workers consistent with affording equal employment opportunities as specified in this chapter, the contractor or subcontractor agrees to be prepared to provide such opportunities to minority and women workers directly, consistent with this chapter, by complying with the hiring or scheduling procedures prescribed under (B) below; and the contractor or subcontractor further agrees to take said action immediately if it determines that the union is not referring minority and women workers consistent with the equal employment opportunity goals set forth in this chapter.

- (B) If good faith efforts to meet targeted employment goals have not or cannot be met for each construction trade by adhering to the procedures of (A) above, or if the contractor does not have a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor agrees to take the following actions:
  - (l) To notify the public agency compliance officer, the Dept. of LWD, Construction EEO Monitoring Program, and minority and women referral organizations listed by the Division pursuant to N.J.A.C. 17:27-5.3, of its workforce needs, and request referral of minority and women workers;
  - (2) To notify any minority and women workers who have been listed with it as awaiting available vacancies;
  - (3) Prior to commencement of work, to request that the local construction trade union refer minority and women workers to fill job openings, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade;
  - (4) To leave standing requests for additional referral to minority and women workers with the local construction trade union, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade, the State Training and Employment Service and other approved referral sources in the area;
  - (5) If it is necessary to lay off some of the workers in a given trade on the construction site, layoffs shall be conducted in compliance with the equal employment opportunity and non-discrimination standards

- set forth in this regulation, as well as with applicable Federal and State court decisions;
- (6) To adhere to the following procedure when minority and women workers apply or are referred to the contractor or subcontractor:
  - (i) The contactor or subcontractor shall interview the referred minority or women worker.
  - (ii) If said individuals have never previously received any document or certification signifying a level of qualification lower than that required in order to perform the work of the construction trade, the contractor or subcontractor shall in good faith determine the qualifications of such individuals. The contractor or subcontractor shall hire or schedule those individuals who satisfy appropriate qualification standards in conformity with the equal employment opportunity and nondiscrimination principles set forth in this chapter. However, a contractor or subcontractor shall determine that the individual at least possesses the requisite skills, and experience recognized by a union, apprentice program or a referral agency, provided the referral agency is acceptable to the Dept. of LWD, Construction EEO Monitoring Program. If necessary, the contractor or subcontractor shall hire or schedule minority and women workers who qualify as trainees pursuant to these rules. All of the requirements, however, are limited by the provisions of (C) below.
  - (iii) The name of any interested women or minority individual shall be maintained on a waiting list, and shall be considered for employment as described in (i) above, whenever vacancies occur. At the request of the Dept. of LWD, Construction EEO Monitoring Program, the contractor or subcontractor shall provide evidence of its good faith efforts to employ women and minorities from the list to fill vacancies.
  - (iv) If, for any reason, said contractor or subcontractor determines that a minority individual or a woman is not qualified or if the individual qualifies as an advanced trainee or apprentice, the contractor or subcontractor shall inform the individual in writing of the reasons for the determination, maintain a copy of the determination in its files, and send a copy to the public agency compliance officer and to the Dept. of LWD, Construction EEO Monitoring Program.
- (7) To keep a complete and accurate record of all requests made for the referral of workers in any trade covered by the contract, on forms made available by the Dept. of LWD, Construction EEO Monitoring

Program and submitted promptly to the Dept. of LWD, Construction EEO Monitoring Program upon request.

(C) The contractor or subcontractor agrees that nothing contained in (B) above shall preclude the contractor or subcontractor from complying with the union hiring hall or apprentice- ship policies in any applicable collective bargaining agreement or union hiring hall arrangement, and, where required by custom or agreement, it shall send journeymen and trainees to the union for referral, or to the apprenticeship program for admission, pursuant to such agreement or arrangement. However, where the practices of a union or apprenticeship program will result in the exclusion of minorities and women or the failure to refer minorities and women consistent with the targeted county employment goal, the contractor or subcontractor shall consider for employment persons referred pursuant to (B) above without regard to such agreement or arrangement; provided further, however, that the contractor or subcontractor shall not be required to employ women and minority advanced trainees and trainees in numbers which result in the employment of advanced trainees and trainees as a percentage of the total workforce for the construction trade, which percentage significantly exceeds the apprentice to journey worker ratio specified in the applicable collective bargaining agreement, or in the absence of a collective bargaining agreement, exceeds the ratio established by practice in the area for said construction trade. Also, the contractor or subcontractor agrees that, in implementing the procedures of (B) above, it shall, where applicable, employ minority and women workers residing within the geographical jurisdiction of the union.

After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Dept. of LWD, Construction EEO Monitoring Program an initial project workforce report (Form AA-201) electronically provided to the public agency by the Dept. of LWD, Construction EEO Monitoring Program, through its web- site, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Dept. of LWD, Construction EEO Monitoring Program, and to the public agency compliance officer.

The contractor agrees to cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the-job and/or off-the-job programs for outreach and training of minorities and women.

(D) The contractor and its subcontractors shall furnish such reports or other documents to the Dept. of LWD, Construction EEO Monitoring Program as may be requested by the Dept. of LWD, Construction EEO Monitoring Program from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Dept. of LWD, Construction EEO Monitoring Program

for conducting a compliance investigation pursuant to N.J.A.C. 17:27-1.1 et seq.

### 17. ARTICLE 17 -- OTHER STATUTORY/MANDATORY REQUIREMENTS BEFORE CONTRACT AWARD

#### 17.1 Political Contributions Disclosure

Compliance with the requirements of Public Law 2005, Chapter 51 (N.J.S.A.19:44A-20.13-20.25) and any derivative statutes or regulations resulting thereof and Executive Order 117, effective November 15, 2008 (Political Contributions Disclosure) and throughout the contract term. The firm understands that failure to abide by the requirements of this statute and to continue to do so, constitutes a material breach of contract in the award or performance of this Contract such that the firm may be disqualified or payments made pursuant to this Contract may be withheld until compliance is perfected.

Prior to contract award the firm shall provide proof that it is compliant with the Requirements of Chapter 51, "Political Activity Disclosure", dated September 22, 2004 and any statutes or regulations which result thereof and Executive Order 117 effective November 15, 2008 ensure that during the course of this Contract that it remains compliant. The firm agrees to notify the University if at any time it is no longer compliant.

The firm understands the University is prohibited from awarding this Contract or issuing payments until the State Treasurer or his designee gives approval that the requirements of the Public Law have been met.

#### 17.2 Business Registration

Compliance with the requirements of P.L. 2004, c. 57 et seq. (Business Registration) and throughout the contract term. The firm understands that failure to abide by the requirements of this statute and to continue to do so, constitutes a material breach of contract in the award or performance of this Contract such that the firm may be disqualified or payments pursuant to the contract may be withheld until compliance is perfected.

Further the firm agrees to advise in writing any subcontractors of the need to comply with this requirement. The firm shall maintain a current list of such subcontractors and their addresses and shall submit the list as needed by the University during the course of performance of this Contract. Prior to contact award, the firm shall provide a copy of its valid Business registration certificate, pursuant to P.L. 2004, c.57 and ensure that such registration remains in effect throughout the period of this Contract. The firm agrees to notify the University if at any time its Business Registration becomes invalid.

Further, the Contractor agrees to procure from any subcontractor's proof of compliance with the Act prior to performing any services pursuant to this Contract. Should firm or any subcontractors fail to maintain a valid registration they understand that the University is prohibited from issuing payments under this

Contract until a valid registration is obtained.

#### **17.3** Conflict of Interest

At no time during the term of the Contract to be awarded hereunder shall the Contractor or any officer, director, general or limited partner or employee of the Contractor: (1) hold an equity or other economic interest in; (2) have a contractual or other business relationship with; or (3) be an officer, director, general or limited partner or employee of any business entity, including but not limited to, corporations, partnerships, limited liability companies and joint ventures, having a business relationship with Stockton University.

The Contractor shall have a continuing affirmative obligation to advise the University of any potential or actual conflict of interest that may arise with respect to its obligations under the Contract.

END OF GENERAL CONDITIONS

# Stockton University

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#### 1.0 Introduction

This Safety Manual applies to the Work performed on any Project as defined by the Contract Documents. All Contractors shall comply, and require all subcontractors to comply, with this Safety Manual. Non-compliance shall be construed as a breach of Contract, which could subject the Contractor to damages, default, termination of Contract, withholding of progress payments, or any other Contract remedy. If the Owner fails to take action for any non-compliance by a Contractor, it will not be considered a waiver of the Owner's right to act for any subsequent breach of Contract. Nothing shall be construed to limit the rights of the Owner to act at law or in equity.

This Safety Manual is intended to establish uniform policies and procedures for all Contractors and their subcontractors, with the goal of reducing accident frequency and severity. These policies and procedures include, but are not limited to, the following:

- The safety requirements of this Safety Manual are a supplementary document to all government rules, codes, and regulations. It is understood that the ultimate responsibility for providing a safe place to work rests with the Contractor (GC). In the event that the GC causes any unsafe conditions to occur which cause delay or damage to the project, equipment, and injuries to personnel, the GC shall be fully responsible for all damages and related costs. The GC shall indemnify and hold harmless the Construction Manager, Owner, and A/E for such damages and related costs
- It is the responsibility of the Contractor to maintain total control of safety to ensure that its employees, its subcontractors, owner occupants, and the general public will be provided an environment free of recognized hazards during construction and renovation activities.
- The Contractor shall conform to the requirements addressed in the Occupational Safety and Health Act of 1970 ("OSHA") and all additions and revisions thereto, and this Safety Manual. This Safety Manual shall be the governing document related to safety issues to which Contractors and all subcontractors shall conform, unless more detailed or stringent requirements are included in the Site-Specific Health and Safety Plan.
- Prior to the start of the Work, the Contractor shall provide a Site-Specific Health and Safety Plan to the owner Project Representative and/or the CM in a timely manner so that the plan can be reviewed by the owner and/or CM no less than fourteen (14) calendar days prior to any work beginning on the job site. The Contractor shall obtain a copy of each subcontractor's job safety analysis and provide copies to the CM. The Contractor shall require that all subcontractors of any tier comply with the site-specific plans provided by the Contractor and subcontractor, and this Safety Manual.
- The Contractor shall assume all costs related to, but not limited to, personal protective equipment, all training requirements, and all requirements of this Safety Manual.
- Failure to include the cost of complying with these safety measures in a bid will not relieve the Contractor from the obligation to implement the requirements in this Safety Manual.

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• Whenever the Contractor or any subcontractor has knowledge of, or is notified of, an unsafe act or unsafe condition, it shall immediately take steps to correct the unsafe act or unsafe condition.

- If the Contractor or any subcontractor refuses to correct an unsafe act or unsafe condition, the Owner's Project Representative is authorized to stop that portion of the Work until the Work can continue in accordance with the requirements of this Safety Manual. The cost to bring the Work activity into compliance shall be the responsibility of the Contractor and at no time shall the costs be borne by the Owner. In addition, a tradesperson may be required to be retrained before returning to work
- Violations of OSHA, US EPA, and various New Jersey agencies can result in the issuance of fines by these organizations. The Contractor shall be responsible for any such fines.
- It is agreed and understood by the Contractor that this Safety Manual is an integral part of the Contract Documents and the Contractor shall incorporate its terms in all of its subcontracts and require its inclusion in subcontracts of all tiers.
- After reading this Safety Manual, the Contractor is required to send to the Owner's Project Representative and CM a copy of its Project Safety Program and prior to starting any work.
- The Construction Manager shall review the safety programs developed by each of the Contractors. The Construction Manager's responsibilities for safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager. The Construction Manager shall not be responsible for any Contractor's implementation of or compliance with its safety programs, or for initiating, maintaining, monitoring, or supervising the implementation of such program or the procedures and precautions associated therewith, or for the coordination of any of the above with the other Contractors performing the Work at the site. The Construction Manager shall not be responsible for the adequacy or completeness of any Contractor's safety programs, procedures or precautions. The General Contractor shall have sole responsibility for the safe performance at the construction site and all workers associated with the construction of this project.
- If unsafe conditions are observed by the CM, the CM shall notify Contractor(s) to take appropriate corrective measures. The CM shall report to the UNIVERSITY, as part of each monthly report, any safety violations and actions taken to protect the safety of persons and property engaged in the work. The CM shall act on behalf of the UNIVERSITY in a manner which preserves the Contractor(s) sole responsibility for the site and personnel safety.

#### 1.1 Definitions

#### Client / Owner

Means Stockton University (SU) in which the Projects are located.

#### Contractor/General Contractor ("GC")

Means a person or firm engaged by SU to undertake Construction Work.

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#### Construction Work or Work

Means the services performed by a Contractor or any Subcontractor on the Projects, whether completed or partially completed and includes all other labor, materials, equipment and services provided or to be provided to fulfill such obligations.

#### • "near miss" incident

Means an undesired event that, under slightly different circumstances, could result in personal harm or property damage. These "near miss" incidents shall be reported to the Client's Safety Department or Risk Management Unit (RMU) and CM within 24 hours.

#### Client/Owner Safety Coordinator

A staff person assigned to oversee the safety and health issues on behalf of the SU.

#### OSHA

Occupational Safety and Health Administration that administers the Occupational Safety and Health Act of 1970.

#### Construction Manager (CM)

Means the firm engaged by the SU to provide overall construction management services, oversight, and reporting in connection with the Projects undertaken by SU.

#### SU - Project Representative(s)

Means an SU staff person(s) assigned to oversee the Project on behalf of SU.

#### Subcontractor

Means the Contractor to whom a Contractor or other Subcontractor subcontracts part of the Construction Work for which such Contractor or other Subcontractor is responsible.

#### Subconsultant

Means the Professional Services Consultant providing services directly, or indirectly, to the Owner, Architect, Engineers, or CM.

#### 2.0 Safety Policy Statement

#### 2.1 Objectives

- To minimize accidents and injuries to Contractor and all subcontractor personnel, client/owner occupants, and members of the public.
- To minimize any damage to the property of the client, the environment, or adjoining property owners and others during the construction process.

#### 2.2 Policy Statement

The safety of persons and property is of paramount importance to SU. This Safety Manual is provided to assist in establishing effective safety programs as an integral part of the overall success of the Project(s).

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The Contractor shall comply, and require all subcontractors to comply, with this Safety Manual, as well as OSHA requirements and all additions and revisions thereto, as well as other applicable federal, State, and local requirements.

The Contractor's on-site supervisory personnel are responsible for maintaining safe and healthy working conditions and for strictly enforcing all safety and health policies and regulations. All Contractor and subcontractor employees shall comply with these rules and regulations.

The Contractor hereby acknowledges that the Work on SU Project(s) property is granted by permission of SU, the Client. The Contractor acknowledges that the Work may be occurring in a learning environment and hereby agrees its on-site operations, and the on-site operations of its subcontractors, will not impact nor impede the learning environment. Further, the Contractor agrees, without condition or reservation, that **there shall be no fraternization between the Contractor's employees, or any subcontractor's employees, and any students**. Failure to comply with this provision by a Contractor's or subcontractor's employee(s) shall result in a request by SU that the employee(s) immediately be removed from the Project Site. There shall be ZERO TOLERANCE and the Contractor shall have no recourse in the event SU or its authorized representative enacts this provision.

#### 3.0 Responsibilities

SU will hold the Contractor responsible for the implementation of the safety, health, and environmental requirements of this Safety Manual for the Work, whether done by its own employees or by subcontractors.

The Contractor and each subcontractor shall implement effective safety and risk control programs. The prevention of accidents and protection of property shall receive SU and management's top priority, support, and participation.

#### 3.1 General Overview

The Contractor and all subcontractors shall:

- Agree to participate in and abide by the Owner's Safety Program and OSHA Safety Regulations. If there is ever a discrepancy between the two plans the more stringent requirement will be required.
- ➤ Use safety planning (Job Safety Analysis) as a tool to reduce injury to persons and property.
- ➤ Conduct daily inspections to locate and abate unsafe conditions and practices before they result in bodily injury or property loss.
- ➤ Provide site-specific plans/job safety analysis to the Contractor, which are to be maintained by the Contractor at the Project Site.
- Establish and/or maintain a site perimeter with a minimum eight (8) foot high chain link fence with appropriately placed, securable ingress and egress. Consideration for debris netting

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shall be made.

Establish Green Zones (safe) and Red Zones (unsafe) for all non-construction traffic.

- ➤ Protect the occupants, public, and property adjacent to the Project Site, as well as the environment.
- ➤ Keep all sidewalks; entrances to buildings, lobbies, corridors, aisles, doors, or exits that remain in use by SU or the public clear of obstructions. The Fire Marshal or AHJ (Authority Holding Jurisdiction) shall approve all exits, temporary or permanent.
- ➤ Provide first-aid kits in accordance with OSHA standards (29 CFR 1926.50).
- Implement a site-wide 100% six (6) foot fall protection policy. This shall include all types of scaffolding and steel erection.
- ➤ <u>Signs</u>. The General Contractor and Subcontractors shall obey the directives of all project signs. General Contractor shall post signs and other warnings, as necessary for the safe performance and completion of Contractor's work.
- ➤ The Contractor shall be responsible, and shall require each subcontractor to be responsible, for the safety and health of their own employees, regardless of who created the hazard.

#### 3.2 General Contractor Safety Coordinator

The General Contractor shall designate an employee as a Safety Coordinator who has, at a minimum, completed a 30-Hour OSHA Construction Industry Outreach Training Program to assume the roles and responsibilities as outlined in the Safety Manual. The client/owner reserves the right to require the General Contractor to provide a full-time Safety Coordinator at any time at the General Contractor's expense, if safety issues persist

.A General Contractor Safety Coordinator is an individual with duties related to the safety of the Contractor's employees as well as the safety of all subcontractors working under the Contractor. This individual shall have the authority to initiate corrective actions for needed safety improvements. Below are the requirements for the General Contractor Safety Coordinator:

The General Contractor Safety Coordinator is required to have completed the 30-Hour OSHA Construction Industry Outreach Training Program. He/she is also required to have completed scaffold training and have knowledge of, and experience in, the construction industry. When the client/owner requires that the General Contractor's Safety Coordinator is full-time, the General Contractor Safety Coordinator is prohibited from performing other duties on the project site.

The Contractor shall provide a resume of the qualifications of the assigned General Contractor Safety Coordinator to the client/owner Safety Coordinator and CM no later than fourteen (14) calendar days prior to work being initiated at the job site. The Client/Owner and/or CM has the authority to

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approve or disapprove of the Contractor's assigned General Contractor Safety Coordinator. The General Contractor Safety Coordinator must be in place prior to the Contractor beginning work on the Project Site and must remain on-site until the work is completed.

Changes to existing General Contractor Safety Coordinators, shall also be submitted to the Client/Owner and/or CM and be approved prior to the person assuming the position.

#### 3.3 General Contractor Safety Coordinator Responsibilities

The General Contractor Safety Coordinator shall be responsible for:

- Promoting total job safety with all employees and visitors.
- Administration, implementation, and execution of this Safety Manual and
- ➤ OSHA Construction Regulations on the Project Site in cooperation with representatives from the CM, and the SU Risk Management Unit (RMU).
- ➤ Continuously monitor and ensure contractors and subcontractors adherence to safety requirements.
- Performing accident investigations.
- ➤ Providing safety orientation and ensuring that all Contractor and subcontractor employees attend Safety Orientation and Trade Training (see Section 4.1 Safety Orientation Training and Section 4.7 Required Training by Trades).
- Ensure that stickers are displayed on hard hats, indicating attendance at safety orientation.
- Ensuring the proper use and care of personal protective equipment by all employees.
- Making daily safety inspection.
- Making, at a minimum, weekly documented safety inspections and initiating appropriate corrective actions to rectify safety deficiencies.
- ➤ Developing site specific Emergency Action Plan, review monthly for changes, and modifying the plan as conditions on the site changes. Issue to all subcontractors, CM, and SU and conduct additional training / orientation as needed.
- Maintaining the GC first-aid kit and monitoring subcontractors' first-aid kits.
- Ensuring site access control measures are implemented.
- ➤ Cooperate fully with SU Project Representative and CM Management team.

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#### 3.4 Subcontractor Competent Person

The Contractor shall require each subcontractor to have a Subcontractor Competent Person to plan for and oversee safety regardless of the number of trade employees on-site. This Subcontractor Competent Person is required to have completed an OSHA 10-Hour course for construction safety and shall meet the definition of a competent person as defined by this Safety Manual and OSHA standards (29 CFR 1926.32).

The Subcontractor Competent Person shall:

- ➤ Use pre-task planning, instructing workers on safe work practices and methods to prevent injury, damage to property, and loss of productive time.
- Ensure that stickers are displayed on hard hats, indicating attendance at safety orientation.
- > Supply and enforce the use of personal protective equipment. A sign that states, "Hard hats, safety glasses, and proper work shoes are required beyond this point" is to be clearly posted at each construction site entrance.
- ➤ Orient workers with the safety requirements applicable to their work. This is in addition to the required safety orientation training (described in Section 4.1 Safety Orientation Training and Section 4.7 Required Training by Trades).
- ➤ Hold weekly "toolbox" safety meetings with his/her work crews. Documentation of these meetings is required and must include topics and content as well as a list of attendees. Documentation of these meetings must be sent to, and maintained by, the CM. These meetings are to be held Monday through Friday.
- Conduct daily safety inspections of his/her work area.
- Assist in accident investigations.
- Assure that proper first-aid equipment is available according to the Work being performed and ensure that treatment is administered to injured employees.

#### 3.5 Communications Responsibility

Although many existing hazards may be corrected through informal communications, all corrective actions must be documented, with copies forwarded to the Contractor, if the condition is identified by a subcontractor, then to the CM and Owner/Client.

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#### 3.6 Safety Responsibility Matrix

Please see the following page for the Safety Responsibility Matrix.

#### SAFETY RESPONSIBILITY MATRIX

	SU	CM	GC	Subcontractors	A/E
Site-Specific Health & Safety Plan - Development & Approval	A	X	■M		
Develop Master Emergency Action Plan	X	X	■M	X	
Job Safety Analysis (i.e.; Critical Lift, Welding) - Development & Approval	X	X	A	X	
Safety Orientation	X	X	■M		
Tool Box Training	X	X	X	X	
Maintain all Safety Training Records	X	X	■M	X	
Site Safety Inspections	X	X	M		
Daily Safety Inspections & Record Keeping	X	X	■M	X	
Periodic Inspections Reporting & Record Keeping	X	X	■M	X	
Remedy Safety Violations/Re-inspect	X	X	■M		
Accident Investigations	X	X	■M	X	
Maintain Material Safety Data Sheets (MSDS)	X	X	■M		
Shut Down Portions of Work	*	X	X	X	
Shut Down Entire Job	A*	X	X	X	
Provide Student/Faculty Safety Orientation	XM				
Project Safety Meetings	XM	X		X	

	Lead	Review /	Approve	Monitor	
Legend		Comment / or	A	M	
	_	Assist			
		X			
	* - Shutting Down Portions of Work may be performed individually by				
	the Client/Owner's Project Manager, CM Authorized Representative,				
	Director of Facilities Planning and Construction, or Executive Director				
	of Facilities Planning and Plant Manager.				
	A*- Shutting Down the Entire Job may be done by the Client/Owner				
	(with approval of the Director of Facilities Planning and Construction				
	or Executive Director of Facilities Planning and Plant Manager, or, in				
	his absence, his designated Project Manager.				

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#### 4.0 Safety-Related Meetings and Training

The following meetings and training will be required on the Project(s). The General Contractor must maintain documentation of the meeting, content, and attendance.

#### 4.1 Safety Orientation Training

- All new employees assigned to the Project shall be properly trained. This training shall include, (but not be limited to) hazard recognition, site-specific health and safety requirements, emergency procedures, Personal Protective Equipment (PPE), and first-aid/medical procedures.
- This safety orientation must occur before beginning the Work at the Project Site. The Contractor's Safety Coordinator will conduct the safety orientation training. The Contractor is responsible for ensuring that all site personnel attend these meetings. Individuals completing this safety orientation training will be provided with a hardhat sticker, which must be displayed.
- The Contractor shall provide safety training for all project personnel in regard to the specific safety requirements and rules related to his/her Work and Trade (see Section 4.7 Required Trade Training).

#### 4.2 Toolbox Safety Meetings

The Contractor and each subcontractor shall conduct weekly toolbox safety meetings on Mondays through Fridays with all of their employees performing Work at the Project Site. The General Contractor Safety Coordinator and/or the Subcontractor Competent Person shall conduct this training.

The meetings shall cover any hazardous work conditions, unsafe work practices that have been identified, safe working practices, analysis of any accidents that have occurred on the Project Site, safety rules and regulations, and any related safety material.

• This training shall be documented on a Toolbox Training Form by the Contractor and shall include names of employees attending the training and an outline of all topics discussed.

#### 4.3 Progress / Coordination Meetings

The intention of these meetings is to discuss the progress and coordination of the Work being performed by various trades so that they may work together to complete the Project in a timely and safe manner. The CM is responsible for scheduling, chairing, and reporting minutes from weekly progress meetings. Safety shall be a part of the agenda of the Progress Coordination Meetings, since verbal reports of the various safety representatives will become part of the meeting minutes. Minutes from the meeting shall reflect safety items discussed and any proposed resolution to safety-related issues.

#### 4.4 Weekly Safety Meeting

The GC is responsible for scheduling, chairing, and reporting minutes. Attendance at this meeting shall be mandatory for the General Contractor Safety Coordinator(s) and all Subcontractor Competent Persons. The purpose of this meeting shall be to discuss any hazardous working conditions that have been observed, identify possible hazards in future work, and discuss all other health and safety issues pertaining to the Project. The CM shall be invited to attend and provide

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any safety observations and recommendations for correction.

#### 4.5 Pre-Shift Hazard Recognition Training

 Every Contractor/subcontractor shall be required to hold pre-shift hazard recognition training with each work crew working when the following conditions are planned for a shift:

- Any walking/working surface that is at an elevation of six feet or greater will require 100% fall protection.
- Scaffold erection and dismantling.
- > Crane and all material-hoisting operations.
- Non-routine work operations, e.g., emergency procedures.
- Any other potentially hazardous activities that pose an abnormal risk of injury to employees as identified by SU, its authorized representatives, and the CM.

#### 4.6 Management Commitment Workshops

Commitment workshops will be held at the Project Site in order to orient management members of the General Contractor's workforce. The General Contractor and his Subcontractors will be required to have, at a minimum, owner or senior executive, project manager, lead superintendent, foreman, and safety representative in attendance.

#### 4.7 Required Training by Trades

It shall be the General Contractor's responsibility to ensure that all personnel entering the project sites have adequate safety training applicable to their particular trade.

#### Operating Engineers

➤ Copies of the New Jersey Department of Labor Crane Operator License or Certification from the National Commission for the Certification of Crane Operations (NCCCO) will be shown to the CM and the General Contractor.

#### Toolbox Safety Meetings

Tool Box Safety Meetings will be conducted Mondays through Fridays as per A.2.

#### 5.0 Project Compliance Procedures

The Safety Manual is designed to ensure compliance with the requirements of OSHA and all additions and revisions thereto, as well as other applicable federal, State, and local requirements, this Safety Manual, and site-specific manuals. Workers performing the Work in an unsafe manner

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that would endanger the employee, other workers, occupants, or the public will be subject to discipline or removal from the site at the request of the SU and/or CM.

The Client/Owner and/or CM, in conjunction with the General Contractor Safety Coordinator, shall determine the course of action best suited to the circumstances. The steps to be taken shall be progressive, except in the most egregious circumstances, and shall include the following:

#### 5.1 Verbal Warning Citation

As the first step in correcting unacceptable behavior, the worker's competent person/ safety coordinator shall review the pertinent facts with the employee. He/she will consider the severity of the problem and the worker's past performance. A verbal warning shall be issued to the worker, which shall be documented and placed in the appropriate file on site, with a copy forwarded to the CM and the SU Project Representative.

#### 5.2 Written Warning Citation

If the unacceptable performance continues, the next step will be a written warning. The written warning shall clearly state the safety policy that was violated and steps the worker must take if it is to be corrected. A written warning requires the General Contractor Safety Coordinator to assure that the worker has satisfactorily completed an appropriate training session related to the safety policy violated. This training must be completed within ten (10) working days from issuance of the written warning. Documentation, with copies forwarded to the Contractor, the CM, and the SU Project Representative, is to be maintained in the worker's personnel file. The General Contractor will monitor completion of the worker's retraining.

#### 5.3 Removal from Site

The SU may request that a worker be removed from a Project Site for safety violations, whether or not verbal and/or written citations have been given.

#### 5.4 Safety Violations

- ➤ When the GC is notified of a safety violation by the SU Project Representative or CM, the General Contractor shall stop the work and take immediate corrective action to assess the task being performed. The task will not be resumed until all affected employees have reviewed changes to the task JSA and signed-off the new document.
- ➤ In the event that the GC causes any unsafe conditions to occur which cause delay or damage to the project, equipment, and injuries to personnel, the GC shall be fully responsible for all damages or related costs. The GC shall indemnify and hold harmless the Construction Manager, Owner, and A/E for such damages and related costs.

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➤ In the event the GC fails to respond to and correct any safety violation immediately upon notification, the Construction Manager and SU reserves the right to take whatever corrective actions are deemed necessary, and the cost of such actions shall be charged to the GC.

- The CM and SU are authorized to issue violation notices including monetary penalties of:
  - 1. \$200 for first violation
  - 2. \$500 for second violation
  - 3. \$1,000 for third violation

Such amounts will be deducted from the General Contractor contract amount via change order and \$ amounts will be placed in a "<u>Safety Incentive Program</u>". The money will be used toward the project as safety awards, acknowledgements, gifts, etc. to incentivize the labor force to conduct their jobs safely and to promote safety awareness on the project.

- ➤ GC employees that do not adhere to the site safety rules will either receive a verbal or written safety citation. The level of the citation will depend on the severity of the violation. Citations and violations may be issued with monetary penalties as described above.
- ➤ Verbal warnings are for any minor issue that, by itself, would not produce either immediate major injury or death. (Example: not wearing work gloves).
- ➤ The SU has the right to remove worker, foremen, and/or supervisors who consistently continue to ignore safety concerns and/or continue to violate safety rules and regulations. At the SU option, zero tolerance violations will result in immediate removal of the violating worker from the site.
- > The SU has a zero tolerance policy for all of the following: Fall Protection, Confined Space, Lockout/Tag out, Hot Work Permits, Firearms, Drugs and Alcohol, Smoking, Cameras, Work Place Violence and Harassment.
- > Zero violations will be considered for:
  - 1. Fall Protection, Confined Space, Lockout/Tag out and Hot Work Violations will result in an immediate stoppage of the work, reorientation and retraining before the employee/employee's involved can return to work.
  - 2. Work Place Violence, Harassment, Firearms, Drugs, Alcohol and Camera violations may result in being banned from the project site, permanently.

#### 6.0 Record-Keeping and Files

The CM shall maintain a master or central file for safety and health related documentation on the Project Site. Files shall be maintained in such a manner that distinguishes the Contractor and each subcontractor. Should a project be of such size that the CM is not onsite; the Contractor shall

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maintain the files and provide a copy to the CM and, upon request, the SU Project Representative.

The SU and its designated representatives shall have the right to review all documentation at any time upon request. If applicable, the Contractor shall give full cooperation, and require the full cooperation of all subcontractors, during these reviews.

The following documentation shall be in the CM's safety files, unless otherwise noted:

- ➤ Written site-specific safety and health plans for the Contractor and all subcontractors.
- ➤ Hazard communication program, including current Material Safety Data Sheets (MSDS). A Project site-specific MSDS file shall be maintained on-site by the CM for employee review. The Contractor must submit, and require each subcontractor to submit, a copy of the MSDSs for those compounds to be used on-site at the Project. This submission should include only those compounds to be used on-site, not a compendium of all MSDSs for the entire company. All MSDS sheets shall be on file prior to those compounds being allowed on-site.
- Contractor and subcontractor daily job site safety inspection reports, including documentation of corrective measures.
- ➤ Documentation of weekly "toolbox" safety meetings, including names of employees attending the training and an outline of all topics discussed.
- Accident investigation reports, including "near-miss" incidents.
- ➤ Competent person qualifications and identification.
- > OSHA Forms 300, and 300a.
- ➤ Job Hazard Analysis (JHA) / Job Safety Analysis (JSA).
- Copies of weekly safety inspection reports.
- ➤ Progress/Coordination meeting minutes.
- ➤ All documentation required by other sections of this Safety Manual.

#### 7.0 Job Site Inspections

#### 7.1 Inspections

The Contractor shall require each Subcontractor Competent Person to conduct daily safety and health inspections for the Work in his/her respective area of the Project Site. Documentation of all identified deficiencies and corrective actions taken shall be maintained by the Contractor for review by the CM, SU Project Representative, and the SU Risk Management Unit (RMU). If requested by CM, the GC shall provide copies of daily safety reports to CM and SU.

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An essential part of isolating the construction process from SU occupants will be the perimeter protection or fence. It is imperative that perimeter fencing be inspected daily (including weekends and holidays) for defects, for damage, and for areas of the fence that could be compromised so persons could gain access. Repairs must be immediate. No exceptions. Additionally, Green Zones (safe) and Red Zones (unsafe) will be defined and clearly marked for all non-construction traffic. The Contractor has the responsibility to protect the SU occupants and the public from the hazards associated with construction, regardless of how difficult it may be.

#### 7.2 Corrective Measures

Corrective measures to abate all deficiencies shall be completed immediately if life-threatening/serious conditions exist or no later than the end of the working shift for non-life threatening/serious conditions. All Work shall be stopped, or effective interim safeguarding implemented, until life-threatening conditions are corrected. All corrective measures shall be documented and available for review by the CM and the SU Project Representative.

If a deficiency cannot be abated immediately, a notice shall be provided to the CM, outlining the reasons and steps taken as an interim measure to control the potential hazard.

#### 7.3 Non-Abatement

If the Contractor or any subcontractor fails to make corrections to identified deficiencies in a timely manner, the CM will:

- Notify the Contractor and appropriate subcontractor in writing to take prompt corrective action to eliminate construction safety and health hazards.
- ➤ Reinforce that any costs incurred to correct the hazard will be back-charged to the Contractor.
- ➤ Provide written notification that will describe specific Contract or code violations.
- ➤ Report in writing to the Contractor/subcontractor the names of individuals and their supervisors who are observed to violate construction safety requirements, with copies to the SU. If necessary, the SU may require the Contractor to remove these individuals and/or their supervisors from the job site.

#### 7.4 Work Stoppage

The SU has authorized the following staff to order, at the Contractor's expense, a work stoppage until unsafe conditions are abated.

- ➤ <u>Shutting Down Portions of Work may</u> be performed individually by the SU Project Representative CM Authorized Representative, Director of Design and Construction. The SU Risk Management Unit (RMU) in consultation with SU Project Representative or the CM.
- Shutting Down the Entire Job may be done by the SU Project Representative (with approval of Director of Design & Construction).

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#### 8.0 Substance Abuse Program

#### 8.1 Substance Abuse

It is the policy of the SU that all construction sites be drug and alcohol free. All employees of any contractor working at the job site shall refrain from the illegal use, possession, sale or distribution of drugs. All employees of any contractor working at the job site shall refrain from all use, possession, sale or distribution of alcoholic beverages at the job site, and shall also refrain from the use of alcoholic beverages outside the job site if such use in any way impairs their ability to work. The SU may require that the contractor remove from the job site any employee who violates this policy and the contractor shall remove any employee from the job site if requested by the SU or CM.

#### 9.0 Accident / Injury Management

#### 9.1 Accident Reporting

**All accidents** resulting in employee injury, property damage, or involving the public shall be reported by the injured/responsible worker's Subcontractor Competent Person (if a subcontractor employee) or by the General Contractor Safety Coordinator (if a Contractor employee) immediately to the SU Project Representative and the CM.

It is the Contractor's responsibility to ensure that related reports are electronically transmitted to the SU Project Representative, the SU Risk Management Unit (RMU), and the CM, describing the occurrence, how the injured was (were) treated on-site or at the designated medical facility, and any follow-up treatment necessary for the worker(s) involved.

- For a **minor incident**, when the worker(s) was treated on-site, the report must be filed within twenty-four (24) hours.
- For a **major incident**, when the worker(s) was taken to the designated medical facility, the SU Project Representative, the SU Risk Management Unit (RMU), and the CM must be contacted immediately by telephone.

#### 9.2 Principal's Meeting for Lost-Time Accidents

If a Contractor or subcontractor employee experiences or causes a lost-time accident on the Project, the CM, SU Project Representative, and the SU Risk Management Unit (RMU), the GC and/or subcontractor (if any), or designee shall attend a meeting at the job site to discuss the incident. This meeting will be called by the CM and will be held within seventy-two (72) hours from the time of the incident.

#### 9.3 Accident Investigation

➤ The General Contractor Safety Coordinator shall complete a Project-specific accident investigation report

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The Contractor shall cooperate, and require the cooperation of all subcontractors, in the investigation, analysis, and defense of any claim, accident, occurrence, or insured loss. The accident investigation report shall be completed by the end of the working day/shift of the accident. Identification and review of accident causes shall be established and completed, identifying corrective actions, persons responsible for corrective actions, and date of completion. Follow-up documentation verifying corrective actions shall be required.

Copies of all accident investigation documentation shall be submitted to the CM, SU Project Representative, and the SU Risk Management Unit (RMU). If required by law, injury notification to OSHA shall be made by the GC, which shall then also notify the CM, SU Project Representative, and the SU Risk Management Unit (RMU) or designee immediately.

#### 9.4 Report of Accidents Involving Occupants

The Contractor shall make reporting of any incidents, accidents, or injuries involving students, staff, or the general public, immediately to the CM and the SU Project Representative, and the SU Risk Management Unit (RMU). A thorough written investigation of any incident or accident must be completed by the end of the working day/shift of the accident by the Contractor with a copy to the CM, SU Project Representative and the SU Risk Management Unit (RMU) or designee.

#### 9.5 Report of Builder's Risk Claim and/or Incident

The Contractor to the CM, SU Project Representative and the SU Risk Management Unit (RMU) or designee shall report any potential Builder's Risk claim or incident immediately.

#### 9.6 Accident Analysis

To identify root causes of accidents and at-risk behavior that directly contributed to an accident, or that have the potential to contribute to an accident, The General Contractor Safety Coordinator shall be required, at the discretion of the SU Project Representative, to meet and analyze accidents. Accident trends shall be identified and plans developed to prevent injury, to develop specific action plan to address root causes and at-risk behaviors, and to implement corrective actions.

#### 10.1 Project Safety and Health Minimum Requirements

The minimum Safety and Health requirements are those contained in OSHA Construction Safety Standards (29 CFR 1926) as well as any other applicable federal, State, municipal, or collective bargaining agreement. The Project Safety Manual includes compliance with all applicable standards as well as those itemized below which exceed OSHA standards. For any Contractor or subcontractor that has been granted exemptions or variances for specific OSHA regulations and/or standards, these exemptions or variances DO NOT APPLY to this Project, unless specifically approved by the *SU Project Representative*.

#### Subpart A—General

The requirements of 29CFR 1926.1 applies to all SU Construction Projects.

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#### Subpart B—General Interpretations

The requirements of 29CFR 1926.10 applies to all SU Construction Projects.

#### Subpart C—General Safety and Health Provisions

#### **➤** C-1—Competent Person Requirements

A Competent Person is defined by OSHA standards (29 CFR 1926.32(f)).

The Contractor shall provide the CM and the SU Project Representative with a matrix outlining employee(s) designated as a competent person(s). This matrix will be:

- Submitted to the CM prior to commencing the Work on-site.
- Supported by documentation of the credentials of each individual identified in this matrix, including training certificates, resumes outlining years of experience, competent person cards, etc.
- Certified to the SU that the competent person will be on-site during all times when the Work under his/her competency is in progress.

The Contractor shall also obtain the matrix described above from each subcontractor and maintain these matrices at the Project Site.

#### ➤ C-2—Job Hazard Analysis

- Prior to the start of the Work activities, the Contractor shall require each subcontractor to submit, in writing, a detailed Job Hazard Analysis ("JHA") of every task to be performed for each construction activity and as may be requested by the CM.
- This analysis shall be ongoing and submitted for new tasks prior to the start of the Work activity.
- Prior to the start of Work, the Subcontractor Competent Person shall be required to discuss the JHAs with individual work crews and shall provide documentation of these discussions to the Contractor.

#### > C-3—Confined Spaces

o The SU Projects require implementation of OSHA standard (29 CFR 1910.146)-Permit Required Confined Space standard. The CM has the right, but not an obligation, to monitor the implementation of this procedure by the Contractor and individual subcontractors. The CM will have the Contractor sign the permit, which will be kept on-site by the CM.

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 The Contractor shall require each subcontractor to perform atmospheric testing prior to entering a confined space. <u>At a minimum, a four (4)-gas monitor (carbon dioxide, oxygen, lower explosive limit, and hydrogen sulfide) shall be used.</u>

- The Contractor is responsible for the costs of any PPE and rescue equipment for confined space entry.
- The GC shall provide all pumping and ventilation equipment required to accomplish and work within manholes or other confined spaces. Air monitoring, and all safety provisions shall be performed in strict conformance with OSHA requirements. GC personnel are to be air packed trained through their own training programs and GC is responsible to provide their own air packs. GC is required to provide all necessary entry rescue equipment, tripod, full body harness, lifelines or equivalent, for all entries. GC is responsible to provide air monitoring during the entire time of entry. GC is responsible to provide documentation of training for all employees involved in confined space operations prior to performing the work.

#### C-4—Illumination

- If there is a need for additional general or specific task lighting, this lighting must be wired with NM Cable or its equivalent as determined by the National Electrical Code (NFPA-70).
- The minimum illumination on a job site shall be ten foot-candles.

#### > C-5—Emergency Action Plans

- The Contractor is responsible for developing an emergency action plan. This
  plan must be coordinated with the master emergency action plan developed and
  implemented by the SU.
- The Contractor shall require each subcontractor to cooperate with the master emergency action plan, including participating in emergency drills as dictated by the CM and SU.
- An emergency evacuation plan shall be part of the Emergency Action Plan. Minimally the plan shall contain means of egress, which shall be updated as the building progresses, identification of a "muster point" and the procedures for accounting for all workers.

#### Subpart D—Occupational Health and Environmental Controls

#### ➤ D-1—Hazard Communication

o The Contractor must submit, and require each subcontractor to submit, a copy of its written hazard communication program to the CM prior to beginning the

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Work on the Project Site. (This is in addition to maintaining a copy of its own and all subcontractors' programs at its own site trailer/field office.)

- The Contractor must submit, and require each subcontractor to submit, to the CM a copy of the MSDSs for those compounds to be used at the Project Site. This submission should include only those compounds to be used on-site, not a compendium of all MSDSs for the entire company. Again, no compound is allowed on-site without an MSDS on file.
- o It is the Contractor's and each subcontractor's responsibility to train their personnel in accordance with the OSHA standards (29 CFR 1926.59).

#### ➤ D-2—Potable Water

 The Contractor and all subcontractors must supply adequate potable water whenever they have personnel on-site and follow OSHA standards for distribution (29 CFR 1926.51).

#### ➤ D-3—Sanitary Facilities

• The General Contractor shall comply with OSHA regulations with regards to sanitary facilities.

#### Subpart E—Personal Protective Equipment (PPE)

All workers and visitors to the Project Site shall be required to wear a hard hat, safety glasses, and proper footwear.

#### **E-1—Eye and Face Protection**

- All personnel shall wear safety glasses 100% of the time as soon as they enter the construction site.
- Minimum eye protection shall include approved safety glasses with side shields, which meet the standards specified in ANSI Z-87.1-1989. This shall also include prescription eyewear.
- During the following operations, eye and face protection, in addition to approved safety glasses, are required:
  - Welding, burning, or cutting with torches.
  - $\blacksquare$  Using abrasive wheels, chop saws, portable grinders, or files.  $\Box$
  - Chipping concrete, stone, or metal.
  - Drilling or working under dusty conditions.
  - Using explosive actuated fastening or nailing tools.
  - Overhead work.
  - Work with hazardous liquids or gases.

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#### **E-2—Head Protection**

All personnel shall wear hardhats that meet ANSI Z-89.1-1997, 100% of the time as soon as they enter the construction site.

- Hard hats shall display the Contractor's or subcontractor's name and/or decal indicating whom the employee works for, as well as the safety orientation sticker.
- Workers exposed to electrical voltage of 600 volts or greater shall wear hardhats that meet the requirements of ANSI Z-89.1-1997 Class E & G type hardhats.

#### **▶** E-3—Hearing Protection

 Any construction personnel exposed to a noise level of eighty-five (85) decibels or higher, regardless of the duration of the activity being performed, shall wear hearing protection, which shall be supplied by the employer. All hearing protection devices shall meet the requirements of ANSI S.319.

#### > E-4—Shoes and Foot Protection

- Well-constructed boots/shoes are required for all SU Projects. Specific requirements include ankle protection and substantial, flexible soles. Exposure hazards dictate whether or not a protective toe guard will be required.
- Sneakers, tennis shoes, athletic shoes of any type, sandals, high heels, or street shoes shall not be worn by construction personnel while on a Project Site.
- Visitors to the site shall be monitored for appropriate footwear.

#### > E-5—Clothing

- o Suitable clothing for construction shall be worn on the Project Site.
- No tank tops, shorts, cut-offs, or ripped or torn clothing are allowed on the Project Site.
- Shirts with sleeves, at least four (4) inches in length, shall be worn at all times.
   All shirts shall be hemmed at the neck, sleeve, and tail. "Muscle/tank top" type shirts are prohibited.
- o Full-length pants are required. Shorts and sweat pants are prohibited.
- Polyester or similar material is not allowed.
- o Dangling jewelry may not be worn.
- o Long hair, which can be caught in moving equipment parts, must be restrained.

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 Frayed pants or clothes with holes pose fire or other hazards and are not allowed on job sites.

#### ➤ E-6—Safety Belts, Harnesses, Lifelines, Lanyards

- Only full-body harnesses meeting ANSI Z359.1 shall be used for personal fall protection. Safety belts are not legal.
- o Refer to Subpart M of this Manual for the fall protection requirements.

#### > E-7—Hand Protection

 Appropriate types of gloves or other methods of hand protection shall be used where required by the nature of the hazard.

#### > E-8 —Respiratory Protection

o The requirements of 29 CFR 1910.134 applies to all SU construction projects.

#### Subpart F—Fire Protection and Prevention

#### ➤ F-1—Open Burning

o No open burning is allowed on SU Projects.

#### ➤ F-2—Hot Work Permit

- The Contractor shall require that any subcontractor involved in hot work (including, but not limited to, welding and cutting) activities perform work under a hot work permit system in coordination with the CM. A fire watch is required to be equipped with a proper fire extinguisher and wear a reflective vest.
- o See Subpart J on Page 27 of this manual for welding and cutting requirements.

#### Subpart G—Signs, Signals, and Barricades

#### **➢** G-1— Working in Occupied Buildings

In order to protect the safety and health of the students and staff of SU, the General Contractor must include in their site-specific safety manual a section on protecting the occupants. Also, the tradespersons and construction activities must be separate. In addition, the contractor should have available a wet/dry vacuum cleaner and high velocity fans available for emergencies. These emergencies can include smoke or water penetration.

The General Contractor shall include, but not be limited to, considering the following areas in situations where construction is to take place in or adjacent to a facility that is occupied by students and/or staff:

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 The CM, the General Contractor, and SU Project Representative shall meet to discuss scheduling and means to minimize any interruption to the educational process.

 Pre-construction testing and planning such that areas disturbed by renovation and demolition must be tested for lead and asbestos. If either is disturbed, plans and procedures must be made to protect the occupants.

If possible, the construction of a demising wall may be established between the construction areas and the educational or administrative spaces such that a satisfactory seal exists.

- Exterior separation of spaces outside of the building perimeters including total site control to minimize risk of unauthorized entry to associated areas.
- As required in another section of this manual, an eight-foot high chain-link fence shall be erected and/or maintained around construction activities.
- o Coordination with facility staff to minimize construction air infiltration into the existing facility by way of the mechanical/HVAC system.
- Establishing means of egress and access into the occupied facility for students, faculty, and construction workers. This shall be established to meet the requirements of NJ Building Code, the local Fire Official, and the SU administration, including necessary security, lighting, and signage. Include fire and life safety drills as needed by building occupants.
- O In situations where work is taking place inside of pre-existing building, all gates/doors into construction areas shall be locked at all times except when a worker/guard is in attendance to prevent unauthorized entry. All construction management and tradespersons shall sign-in when entering the construction area through a gate/door designated by the General Contractor with input from the CM and SU Project Representative. This will insure that all personnel are accounted for should an evacuation be required.
- As required in another section of this manual, the General Contractor shall purchase and distribute to all tradespersons who have completed the site-specific safety orientation identification badges.
- Contractor should take all necessary steps to minimize any occurrences of indoor air quality (IAQ) concerns throughout the construction project.
- On an as needed basis, testing of air quality should be performed as required by state fire code, no smoking is allowed on SU project sites.

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# ➤ G-2—Separation of Construction Area

 Clear separation between construction areas (Red Zones) and areas occupied by occupants (Green Zones) shall be present at all times.

- The Contractor or any subcontractor shall not be permitted to work within confines of the operating spaces without prior written approval from the CM and/or SU Project Representative. All requests shall be submitted in writing at least ten (10) working days prior to the date being requested. Written requests shall detail every aspect of the Work to be completed.
- The CM may restrict access to occupied areas to periods including, but not limited to, non-operation hours, weekends, holidays, and nights on a site-specific basis.
- o It is the policy of the SU that construction shall work around education; education will not work around construction.

# Subpart H—Materials Handling, Storage, Use, and Disposal

- <u>Deliveries.</u> The GC and Subcontractor shall direct all shipments and deliveries related to the Work to the designated gate for site access. Deliveries shall be properly marked and identified with the name of the project, project number, and Subcontractor's name. The GC, his Subcontractors, and their authorized representative will be required to sign for their deliveries. All delivery personnel shall adhere to the project minimum safety standards. Each GC and his Subcontractors shall provide Flagmen, where necessary. Large deliveries of equipment or materials, which will require road blockages or otherwise restrict access to the project site, shall be coordinated with the Construction Manager at least one (1) week in advance. Unloading large deliveries, which involve cranes or hoists, shall be performed in accordance with OSHA and the Project's Safety Program Procedures.
- Material Storage. Materials and equipment shall be properly stored in designated locations determined by the General Contractor after commencing within accordance with safe practices for stacking height, tie-off, and protection. Materials shall not be stacked or stored in any area unless prior authorization is received. All materials stored in the building shall be maintained in a neat and orderly fashion. All materials shall be stored off the floor on pallets, racks, scaffolds, etc. Materials designated for interior use must be protected from moisture at all times.
- <u>Flammable/Combustible Material</u>. Bulk storage of all flammable or combustible materials shall be a minimum of fifty (50) feet from any building. No more than one (1) day's working supply of flammable or combustible materials shall be permitted in the building. Only UL/FM approved containers and dispensing facilities shall be used.

#### ➤ H-1—Disposal

• The Contractor and every subcontractor are responsible for disposal of their own construction debris and the proper action to keep areas around dumpsters clean.

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# ➤ H-2—Unattended Tools & Equipment

 Tools and equipment shall not be left unattended while in areas occupied or accessed by SU occupants. Offending parties shall be escorted from the job site and not allowed to re-enter until properly retrained.

# Subpart I—Tools - Hand and Power

#### ➤ I-1—Portable Power Tools

- All portable power tools must be inspected as per OSHA standards (29 CFR 1926.300). Additionally, the Contractor shall require all subcontractors to institute the Project's tool inspection Manual as below:
  - Extension Cords used with portable tools must be of heavy-duty threewire type and an inspection procedure for extension cords shall be implemented.
  - Flat extension cords are prohibited.
  - Damaged electrical cords will not be allowed. (Refer to Subpart K, paragraph K-3, of this Manual for general electrical cord and grounding requirements.)
  - Tools with defective electrical cords will be immediately taken out of service by an effective method. Cutting off the cord or applying a locked cover for the plug would be considered effective methods. Anyone observed using defective tools or extension cords shall be required to attend retraining.

# ➤ I-2—Ground Fault Circuit Interrupter ("GFCI")

- The Contractor or subcontractor will maintain GFCIs on all generators or power supplies for which they are responsible.
- o Refer to Subpart K of this Manual for general electrical requirements.

#### Subpart J—Welding and Cutting

### **▶** J-1—Hot Work Permit

- A Hot Work Permit is required at all times for any welding, brazen, and/or torch cutting.
- Permit applications will be reviewed and approved by the GC as soon as possible, but approval may take as much as four (4) hours.

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#### **➤** J-2—Fire Watch

As part of the hot work permit procedure, a fire watch is required during the actual work as well as a final inspection of the site two (2) hours after the completion of the hot work. A proper fire watch reflective vest and a proper-sized (minimum ten (10) pound ABC) fire extinguisher are required.

# ➤ J-3—Welding & Cutting Equipment

- All welding and cutting equipment must be labeled with the owning Contractor or subcontractor's name.
- o Welding leads and cutting hoses shall be kept clear of walkways and stairways.

# > J-4—Cylinders

- Oxygen and acetylene cylinders shall be identified with the name of the Contractor or subcontractor on each.
- o Cylinders shall not be stored inside buildings.
- Oxygen and acetylene tanks shall not be stored within twenty (20) feet of each other, unless separated by a ½-hour fire rated barrier.
- Operation and use of oxygen and acetylene tanks shall be in accordance with OSHA Standards.

# > J-5—Disposal

o Spent welding rods shall be picked up and disposed of daily.

#### Subpart K—Electrical

# ➤ K-1—Temporary Electrical Work

 All temporary electrical work shall be in accordance with the pertinent provisions of the National Electrical Code (NFPA-70) and local standards.

# ➤ K-2—Ground Fault Circuit Interrupter ("GFCI")

- o All 110-120 volt, single phase, 15 and 20 amp temporary power circuits (with the exception of temporary lighting) shall have ground GFCIs installed.
- o All portable generators shall have properly functioning GFCI outlets.
- o All portable generators shall be properly vented.

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 GFCI receptacles and circuit breakers shall be tested weekly with a multi-range GFCI tester (the tests shall be documented) to ensure the GFCI is properly functioning and protecting the worker.

 Contractor or subcontractors using the permanent electrical supply to the building must use portable GFCIs.

#### ➤ K-3—Extension Cords

- Extension cords used with portable tools must be of heavy-duty three (3) -wire type.
- o Flat extension cords are prohibited.
- o Damaged electrical cords will not be allowed.
- All extension cords will be suspended seven (7) feet above the floor or working surface. Extension cords will not be fastened with staples, hung from nails, or suspended by non-insulating wire.
- The Contractor is responsible for all cords being used at the Project Site.

# ➤ K-4—Lockout / Tag-Out

- Electrical equipment or machinery shall be de-energized and rendered inoperative prior to work beginning on the equipment.
- The electrical contractor shall be required to develop a site-specific LockOut/TagOut program for all site contractors to follow. Lockout/tag-out shall be performed in accordance with OSHA standard (29 CFR 1910.147).
- The failure to follow lockout/tag-out procedures will result in immediate removal from the Project Site.
- Unauthorized removal or tampering with locks or tags which are utilized, as part
  of a lockout/tag-out will result in the SU requiring immediate removal from
  the Project Site.

#### ➤ K-5—Circuits

 Circuits with voltages greater than 110-120 volts must be identified with the actual voltage, and higher voltages shall have "danger" or "warning" signs posted.

# ➤ K-6—Conductive Material

• Fish tapes or lines made of metal or any other conductive material are prohibited. Non-conductive tapes and lines will be used in their place.

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# Subpart L—Scaffolds

Under certain conditions, the CM may require certification from professional engineers ("PEs") for the erection of scaffolding.

Free-standing scaffold towers used externally must not be higher to the top platform level than three times the minimum base dimension, unless secured to a permanent structure. For internal use only, the height to platform may rise to 3.5 times the minimum base dimension. Wheels must be locked when towers are in use. No person is permitted to remain on a tower platform while a tower is being moved.

# **▶** L-1—Scaffolding Competent Person

Prior to beginning any scaffold erection, the Contractor shall submit, and require
its subcontractors to submit, the name and credentials of its scaffolding
competent person to the CM.

#### **▶** L-2—Scaffold Inspection

 The Contractor shall maintain an approved scaffold inspection with a tag system on the scaffold with daily inspections and signatures of an OSHA-defined competent person.

# **▶** L-3—Common Scaffolding

Common scaffolding shared by subcontractors must be PE-designed and the
actual installation inspected and approved by a PE, at the discretion of the CM.
The PE must also review the design and inspect the scaffolding prior to its next
intended use by a different subcontractor.

# ➤ L-4—Outriggers

• Scaffolding with any dimension of forty-five (45) inches or more shall be equipped with outriggers.

# ➤ L-5—Carpenter Bracket Scaffolds

 Carpenter bracket scaffolds over four (4) feet in height shall be protected by standard guardrails.

#### ➤ L-6—Guardrails

 All scaffolds, Baker-type, over four (4) feet in height, having a minimum horizontal dimension in either direction of forty-five (45) inches or less, shall have standard guardrails. Safety Manual Page 32 of 44

Standard guardrails shall be installed on any scaffolding work level that is six (6) feet above a lower level. If a standard guardrail is not feasible, a personal fall arrest system (including, but not limited to, harness, lanyard, and anchor) shall be used.

# ➤ L-7—Scaffold Planking

- All scaffold planking shall be free of knots and cracks and shall completely cover the work platform. All planking used on a scaffold shall be stamped "SCAFFOLD PLANK" or SCF PLK," and shall meet requirements of Subpart L of the OSHA Standards.
- Only planking that has been inspected prior to placement and that has had its ends color-coded "green" is permissible for scaffold planking.
- Planking that is damaged or that has not been inspected shall be color-coded "red" and cannot be used for scaffold planking.
- All scaffolds and planking shall be tagged, inspected daily, and signed off by an OSHA-defined competent person.

#### ➤ L-8—Elevated Work Levels

O Debris fencing, netting, or other methods to protect personnel and property below shall be provided at all elevated work levels of scaffolding.

#### ➤ L-9—Toe Boards

Toe boards on scaffolding are required per OSHA standards (29 CFR 1926.451(h)) or as determined by the competent person.

#### Subpart M—Fall Protection

This project shall comply with the following Falls Mandate Requirements:

- A. Vertical Access to Working Floors: Access to poured floors:
  - 1) Stairs poured with deck
  - 2) Pre-cast poured with deck steel structure
  - 3) Set stairs with deck
- B. Access to Framing Erection Floor
  - 1) <u>Scaffold stairs with handrails up to and including roof level and at</u> multiple locations.
- C. Frame Erection
  - 1) Structural Steel Erection to be completed with mechanical lifts (i.e., aerial lifts/buckets)
- D. Perimeter protection

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- 1) Five foot (60") high perimeter protection covered with netting at all floors including roof level
- 2) Provide (3) wire ropes at every floor and around all floor openings including roof level.
- E. Lifting over or adjacent to or beyond the site boundary then adequate physical protection will be provided using:
  - 1) Access separate for vehicles/personnel
  - 2) Sidewalk canopies
  - 3) Road/sidewalk closures
  - 4) Flag personnel
- F. Working Platforms
  - 1) Working platforms fit for purpose via pre-task planning
- G. Fixed access system
  - 1) Scaffold system in or around existing structure, erection and dismantling to be completed using 100% tie off.
- H. Mechanical access system
  - 1) Working platforms fit for purpose via pre-task planning
- I. Elevator shafts
  - 1) Full height protection with lockable access door at all elevator shaft openings.
- J. Service shafts and risers
  - 1) Safety straps installed at all shaft and riser locations
  - 2) <u>Installation and dismantling of shaft and riser protection shall be 100%</u> tie off
  - 3) 2 layers of horizontal protection or full height perimeter protection
- K. Excavations . Pits and Holes
  - 1) Excavations Install warning fence (i.e. snow/orange construction fence) around perimeter (10 foot back if possible) with designated separate access points for people and equipment.
  - 2) Trenches When not actively working the trench, install warning fence (i.e. snow/orange construction fence) around perimeter (10 foot back if possible) with designated access points for people and equipment.
  - 3) Access to mass excavations/foundations (minimum 2 access points) via:
    - (a) ramp (all workers to have bright colored vests and be separated from equipment)
    - (b) scaffold stairs
    - (c) prefabricated stairs
- L. Ladders <u>Ladders shall only be used for access and not as a place of work unless three points of contact can be maintained.</u> The use of platform ladders should be used as an alternative to step ladders. <u>The use of step ladders should be restricted to areas where no suitable alternative (e.g. scissor lifts and podium steps) can be utilized and only for light, short duration work (i.e. lasting less than 15 minutes).</u>

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#### ➤ M-1—Personal Fall Protection System

 Personnel working at a level exposed to a fall distance of six (6) feet or greater (or less if a fall would result in the likelihood of a serious injury or death) shall be protected by the means of a personal fall protection system.

#### ➤ M-2—Fall Prevention Controls

- Fall prevention controls shall be based on the principles established by engineering and design techniques for elimination and prevention of fall hazards and shall be utilized above the use of personal protective equipment.
- When it is not feasible to provide fall prevention controls, workers exposed to falls shall be provided with and use a full body harness, retractable lanyards, lanyards with shock absorbers, and anchorage points as specified per OSHA standards (29 CFR 1926 Subpart M).
- Holes, shafts, and edges, from or through which persons could fall a distance of more than six (6) feet, must be clearly marked with signage or other means and be adequately protected.

#### ➤ M-3—Body Belts

 Body belts are not permitted on the Project Site as a component of the personal fall protection system.

#### ➤ M-4—Task Specific Fall Protection Plan

 The Contractor shall require all subcontractors performing structural erection activities (such as pre-cast concrete and steel erection) to include in their sitespecific safety plan a "Task-Specific Fall Protection Plan", which complies with the six (6) foot fall protection requirement.

#### ➤ M-5—Ladders

- Scaffolds and Platform Ladders. The Project's Fall Mandate Policy requires the use of scaffolds or mechanical lifts during all phases of construction. The use of other means of vertical access will be on a task specific basis only. Contractor is required to provide either the permanent project stairs or scaffold type ladders to the roof level during or immediately after steel erection to provide a safer vertical access. Use of standard "A" frame step ladders will not be permitted without a written JHA and pre-use review by the CM.
- O <u>Ladders</u> (straight, extension, and step) shall be used only for employee access and short-duration (15 mins or less) miscellaneous light work where three (3)

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#### point contact with the ladder can be maintained.

o If ladders are to be used for performing long-duration (more than 15 mins) heavy work at heights six (6) feet and greater (or any height where the likelihood of a serious or fatal injury exists), the fall hazards shall be controlled through the use of a personal fall protection system, scissor lifts, and/or podium steps.

- o Fiberglass or wood ladders only shall be used. Aluminum or other conductive portable ladders are not permitted on a Project Site.
- Aerial and Scissor Lifts. The General Contractor and his Subcontractors shall ensure all lifts arrive on the project site in proper working condition and with current third party certification that said unit is safe to use. Employees utilizing said lifts shall be trained by a qualified third party to operate the specific lift, according to the applicable ANSI and manufacturer's guidelines. Documentation of both certifications shall be provided to the Construction Manager prior to work commencing. All lifts on the project site must be equipped with audible and visual (strobe lights) motion warning systems. Additionally, all lifts must be equipped with manufacturer installed, engineered fall restraint anchorage points. All employees working in lifts must work within the confines of the guardrail system or bucket, with their feet on the deck and be anchored to the engineered anchorage point utilizing a full body harness and shock absorbing lanyard system. No body belts will be permitted.

# Subpart N—Cranes, Derricks, Hoists, Elevators, and Conveyors

# > N-1—Inspections

- All operating engineers and other equipment operators shall present the CM with their license, which shall be kept on file with the CM.
- A copy of the OSHA required annual inspection shall be submitted to the CM at least twenty-four (24) hours prior to the crane arriving on-site.
- A competent person shall perform and document all manufacturer-required inspections prior to and during each use. Documentation of all manufacturer required inspections shall be maintained by the subcontractor for review by the CM and SU Project Representative.

# ➤ N-2—Pile Driving

o The crane requirements apply to pile driving equipment and caisson equipment.

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# ➤ N-3—Other Mobile Equipment

 Lulls and other mobile equipment, not classified as cranes, shall be in compliance with other appropriate OSHA standards such as (29 CFR 1910.178)
 Powered Industrial Trucks.

 Unless a vehicle does not come with seat belts, operators at all times, no exceptions, shall wear seat belts.

#### ➤ N-4—Load Chart

- Cranes must have a load chart and operations manual that is for the exact model of crane.
- The Contractor shall require its subcontractor to certify that the operator has read the operator's manual and can interpret the load chart.
- o The Contractor shall require all subcontractors to certify that the operator has been advised that he/she shall not exceed the load chart.

# ➤ N-5—Capacity

 For lifts of any load that are more than 60% of a crane's rate capacity the CM and SU Project Representative shall be notified prior to the lift.

#### ➤ N-6—Operator Qualifications:

- A valid New Jersey Crane Operator License is required. A copy of this license
  must be maintained on the job site in the Contractor's and subcontractor's
  central file for safety and health documentation.
- o All operators must be experienced in the type of crane being used.
- An up-to-date resume detailing the operator's qualifications (including, but not limited to, years of experience and previous jobs worked on) shall be maintained in the Contractor's and subcontractor's files at the job site.

#### ➤ N-7—Anti-Two Blocking Device

 All cranes operating on the construction site shall be equipped with a functioning "anti-two blocking" device.

#### > N-8—Communications

 There shall be two means of communications between crane operator and signal person. If the signal person is visible to the operator, then two-way radios shall Safety Manual Page 37 of 44

serve as back up. If the signal person is not visible to the crane operator, then a hard-wired phone system shall be the primary means of communication with two-way radios as back up.

# ➤ N-9—Soil Capacity

o Under certain soil conditions, the CM and SU Project Representative may require that a Professional Engineer (PE) inspect and certify that the soil is capable of supporting the weight of the intended crane and the anticipated loads. The PE may require additional cribbing or other material to support the loads.

# Subpart O—Motor Vehicles, Mechanized Equipment, Etc.

- Equipment. The General Contractor and his Subcontractors shall supply all equipment required for the performance of the Work of this Contract. Equipment shall be maintained in safe operating condition, and employees shall be properly trained in correct operating procedures and documentation of said training provided to the Construction Manager prior to performing work. (All cranes, aerial and scissor) material-handling equipment must have a valid certificate of inspection, as required by the manufacturer and safety checklists must be submitted on a daily basis).
- Where any Federal, State, or Local regulations require special training and/or licensing for operators of specific equipment, the General Contractor and his Subcontractors shall provide the Construction Manager copies of the required training documentation and required licenses for each employee required to operate the specific equipment.

# > O-1—Riding Mobile Equipment

 No one shall ride in a vehicle or mobile equipment unless it is designed to accommodate additional personnel. Violators shall be removed from the Project Site.

# ➤ O-2—Pick-Up Trucks

o Riding in the back of pick-up trucks shall not be allowed.

# ➤ O-3—Non-Licensed Motorized Equipment

 ATVs, golf carts, or other non-licensed, motorized equipment used to transport people and or tools/equipment shall be inspected and operated in conformance with ANSI, DOT, OSHA, and any other appropriate governing body.

# Subpart P—Excavations

- <u>Excavations.</u> The GC shall investigate all existing underground conditions, and obtain necessary approvals and permits and notify the state one call system (where applicable) prior to commencing any excavation work.
- The contractor on this project will be required to conduct his own investigation using the

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necessary equipment/detectors/tools to locate existing utilities prior to excavation.

• All excavation work shall be performed in strict conformance with the OSHA regulations, and the GC shall provide a competent person (per OSHA) and all required shoring, bracing, and protective barricades and rails to accomplish the Work in a safe manner.

- Where there is a risk of injury from persons, plant and/or materials falling into excavations, pits and holes or from the collapse of the excavation sides, barriers or edge protection should be provided or the edges sloped to gradients, which prevent falls, and/or a suitably designed trench support system should be introduced. Where water is present, additional measures should be taken to prevent grounding.
- Any excavations shall be barricaded with fencing or equal and marked with suitable warning lights.

#### > P-1—Excavation Permit

o All excavation shall be in accordance with applicable OSHA Standards.

#### > P-2—Soil Classification

 All soils shall be classified as type "C" until the competent person can demonstrate the soil can be reclassified as another type, using acceptable soil analysis practices.

#### > P-3—Barricades

o All open excavations and trenches shall be barricaded or adequately guarded at all times with high-visible material.

#### > P-4—Contaminated Soil

 The SU may have areas with contaminated soil. Depending on the nature and extent of hazards related to this contamination, specific safeguarding methods shall be implemented.

# Subpart Q—Concrete and Masonry Construction

All concrete and masonry construction shall be in accordance with applicable OSHA Standards.

# Subpart R—Steel Erection (and Pre-cast Concrete Erection)

# ➤ R-1—Hoisting, Rigging, and Loads

 Under certain soil conditions, the SU Project Representative and/or CM may require that a Professional Engineer (PE) inspect and certify that the soil is capable of supporting the weight of the intended crane and anticipated loads. The PE may require additional cribbing or material. Safety Manual Page 39 of 44

A safe means of access to the level being worked on shall be maintained.
 Climbing and sliding on columns or diagonals are not allowed.

- Containers, buckets, bags, etc. shall be provided for storing or carrying bolts or rivets. When bolts, drift-pins, or rivet heads are being removed, a means shall be provided to prevent accidental displacement. Tools shall be secured in such a manner to prevent accidental falling.
- Lifeline attachments, dynamic fall restraints, and other fall protection provisions shall be considered during shop drawing preparation, shall be incorporated in fabricated pieces, and shall have safety lines or devices attached prior to erection wherever possible.
- A tag line of appropriate length shall be used to control all loads or portions thereof.
- o For the protection of other trades on the Project, signs shall be posted in the erection area, "Danger: Men Working Overhead".
- When loads are being hoisted, all personnel are to be prevented from walking under the lift.
- o No one shall be permitted to ride a load under any circumstances.
- Material shall not be hoisted to a structure unless it is ready to be put into place and secured.
- Bundles of sheets or small material shall be so secured as to prevent falling out from the rigging.

#### ➤ R-2—Fall Protection Requirements

- The use of personal fall arrest systems shall be rigorously enforced during steel and pre-cast concrete erection.
- O The contractor shall implement a site-wide 100% six (6) foot fall protection policy. This shall include all activities including steel erection and scaffolding operations, where a worker is exposed to a fall greater than six (6) feet, shall be protected by a fall protection system such as guardrails, safety nets, personal fall arrest system, hole covers, or fall restraint system. Steel erection shall be accomplished using either aerial platform/buckets or other acceptable means.
- The exception contained within OSHA standards (29 CFR 1926.501.b.12) allowing for a written fall protection program in lieu of this requirement is not acceptable for the Project and is prohibited.

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#### ➤ R-3—Perimeter Protection

o Provide (3) three wire ropes at a total height of five feet (60"), at every floor and around all floor openings including roof level.

- o Provide orange netting to full 60" height of all perimeter protection.
- Ouardrails are to be provided at all working places including roof level and other locations where persons or materials could fall more than 6 feet. Where this can physically not be achieved, suitable and sufficient fall protection devices that do not rely on individuals should be provided and used to establish a safe place of work. Harnesses and personal protective equipment must be used as a last resort.
- All wire rope cable connections shall have loop connections (butt-splicing is prohibited) and will require a minimum of two (2) wire Crosby rope clips as specified in OSHA standards (29 CFR 1926.251 Subpart H, Table H-20).
- o If the wire rope cable system has been designed for an anchorage point for a personal fall arrest system, at least three (3) wire rope clips must be used as specified in OSHA standards (29 CFR 1926.251 Subpart H, Table H-20).
- Any systems used for an anchorage of personal fall arrest systems shall be inspected and approved by the competent person using the cable for this purpose.
- o Turnbuckles will be installed at suitable intervals to maintain the tightness of the wire rope but in no instance less than one (1) per perimeter side.
- O All anchorage for the wire rope cable will be capable of withstanding a minimum of 200 pounds of force if the wire rope is used as a guardrail system or a minimum of 5,000 pounds of force per person attached if the wire rope is used as an anchorage for a personal fall arrest system.

#### > R-4—Erection Plan

- The erection subcontractor shall have a qualified person prepare a site-specific safety erection plan prior to the erection of structural members. This erection plan shall be reviewed with the CM and SU Project Representative.
- An erection subcontractor qualified person shall approve all changes in the safety erection plan.
- A copy of the erection plan shall be maintained at the job site, showing all approved changes.

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• The implementation of the erection plan shall be under the supervision of a competent person.

# Subpart S—Tunnels and Shafts, Caissons, Cofferdams, Etc.

All tunnels and shafts, caissons, cofferdams, etc., shall be in accordance with applicable OSHA Standards.

# Subpart T—Demolition

All demolition shall be in accordance with applicable OSHA Standards.

<u>Dust and Fumes.</u> The GC shall not perform any Work, which generates excessive dust or fumes in or adjacent to any portions of the project where such dust or fumes will create a negative impact on adjacent parking lots, streets, buildings, etc. The GC shall provide suitable ventilation and dust control measures to maintain satisfactory conditions, or perform such work after the normal working hours of potentially impacted areas. GC agrees to provide all cleaning and cleanup reasonably required by the Construction Manager pertaining to the GC's work to the extent such requirements are in excess of those contained in this paragraph.

### Subpart U—Blasting and Use of Explosives

#### ➤ U-1—State & Local Laws

• The authority having jurisdiction (i.e., local or state fire marshal) should be contacted by the GC in accordance with State and local laws.

#### Subpart V—Power Transmission and Distribution

All power transmission and distribution shall be in accordance with applicable OSHA Standards.

#### Subpart W—Rollover Protective Structures, Overhead Protection

All rollover protective structures and overhead protection shall be in accordance with applicable OSHA Standards.

### Subpart X—Stairways and Ladders

#### > X-1—Conductive Ladders

 Fiberglass or wood ladders only shall be used. Aluminum or other conductive portable ladders are not permitted on a Project Site.

#### > X-2—Personal Fall Protection

• When working on/from ladders at an elevation (measured from the feet of the worker) above six (6) feet, workers are required to be protected by personal fall

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arrest and restraint system. Workers may ascend and descend ladders above six (6) feet elevation without personal arrest systems.

# > X-3—Stairways

Stairways may only be used when the stairwell tread and guardrails are in place.
 Stairways, which do not have stairwell treads and railings, shall be barricaded to prevent use.

# > X-4—Tipping or Falling Exposure

o All extension or other ladders, except stepladders, shall be tied off.

#### Subpart Y—Commercial Diving Operations

All commercial diving operations shall be in accordance with applicable OSHA Standards.

### Subpart Z—Toxic and Hazardous Substances

All toxic and hazardous substances shall be in accordance with applicable OSHA Standards.

# 11.0 Waste Disposal

This section contains only requirements as applied to disposal of construction supplies and materials. Nothing in this section shall be interpreted to limit or replace any federal, State, or local EPA requirements or standards.

- A Contractor who creates, may be expected to create, or could accidentally create a material that could be classified to be hazardous waste shall provide to the CM a copy of their EPA disposal number and other pertinent information.
- All hazardous waste, or waste that could be considered hazardous waste, as determined by the methodology and definitions from environmental regulators, will be stored and collected in special areas and disposed of as directed by the SU Project Representative.
- No material is to be abandoned on a Project Site. If material found on a Project Site can be traced to a Contractor, that Contractor will be responsible for all expenses involved in collecting, moving, cleaning, and disposing of all material in the area where the material was abandoned.
- Should a potentially hazardous condition be discovered the GC shall immediately notify the CM, and SU Project Representative.

# 12.0 Site Security/Access Control

An effective means of controlling personnel entering and exiting the site is to be implemented. The objective is to check that the worker is authorized to perform the work and that they have received a suitable orientation. This will also ensure that the public are protected and that all visitors are treated in accordance with standard protocol.

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Site Access/Security is to be provided as follows:

 A physical barrier is installed to prevent access to the workplace. Examples of such barriers include fencing, covered walkways, temporary walls or other physical barriers.

- The site logistics plan must include a separate access point for vehicular traffic to segregate persons from risk of injury.
- Signage is to be placed at each entrance/exit point to communicate the need to check in.
- The site access points are to be placed so that an effective means of control can be implemented to prevent the public from unauthorized entry.
- Consideration should be given to reducing the number of access points to reduce the possibility of unauthorized access.
- A minimum of two exit points are to be maintained to ensure the site can be evacuated in case of an emergency.
- Entry points are to be manned by a site access control person (SACP) while in use. Those not manned by SACP must be closed at all times unless, and until, they can be controlled by a SACP.
- A system is to be implemented to readily identify workers who have received an orientation. A colored sticker on a hard hat is an acceptable means of identification.
- Access points used for vehicular traffic are to be controlled by rolling gates in preference to swing gates where room allows.
- All workers must receive a full orientation before commencing work.
- All workers receiving an orientation are required to sign a document confirming they understood the content. This document will enable the site team to keep track of the workforce.
- All visitors are to check in with the General Contractor and/or CM and must be accompanied on the site. They are to sign a hold harmless release form.
- Delivery drivers (including UPS, FedEx, USPS, etc) are exempt from requiring a full orientation; however, they should not be allowed to walk the site freely.
- All workers working in occupied facilities will be required to wear an ID badge with the minimum required information (company name, name, picture ID, project name, ID badge number).
- The General Contractor will be responsible for issuing the ID badges to all workers in a format acceptable to the SU and/or CM.
- The SU and CM reserve the right to require all workers to wear ID badges at any time. Badges shall be worm in a visible location by the employee at all times while working on the project, and which shall be returned upon termination of employment.
- Inspection. All vehicles and personnel entering or leaving the project site are subject to security checks and searches at the discretion of the SU Representative or Construction Manager's team.
- Speed Limit. The speed limit within the project is 5 MPH if conditions or the character of the subject vehicle allow. General Contractor and his Subcontractors employees operating vehicles in excess of the speed limit, or in any otherwise unsafe manner, will be directed to leave the site and not be permitted to return.
- Pedestrians. Pedestrians have the uncontested right-of-way at all times.

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Cameras. Cameras are not permitted within the project site without prior consent of the Construction Manager and Owner. This includes all video recording devices, as well as mobile devices (mobile phones, PDA's, etc.) which contain cameras or video recording equipment.

- Site Parking. General Contractor and his Subcontractors employee parking within the project site is permitted. Vehicles permitted to park on the project site shall be insured by the General Contractor or Subcontractor's company. General Contractor and his Subcontractor's vehicles may park outside the parking project area in areas designated or assigned by the SU and/or Construction Manager.
- Trailers. The General Contractor and his Subcontractors shall locate approved field office or material storage trailers only in designated areas. Trailers shall be properly maintained, and the surrounding area kept clean and free of litter or debris. Trailer space will be designated by the Construction Manager and/or the Owner. Due to space limitations, trailer space will be limited. Refer to the generic site logistics plans as shown in the Contract Documents. Trailers must have an electrical certification (current) prior to coming on site. All trailers must have a lockable electrical disconnecting means.
- Temporary Services. The General Contractor shall not make any connections to services or utilities (i.e.: electric, water, steam, air, gas, tele/data, etc.) for temporary use unless approved by the Construction Manager and utility owner. Temporary services (both hook-up and maintenance/usage) to each of the General Contractor and his Subcontractors trailers are the responsibility of the General Contractor unless notified otherwise.
- Emergency Procedures. The General Contractor shall immediately report any damage to site utility or service piping or power systems to the SU Police Department and Construction Manager. All emergencies shall be reported as stated in the Emergency Action Plan.

# SUPPLEMENTARY GENERAL CONDITIONS

# **Building 70 HVAC Improvements**

- 1.1.11 Add to the end of the paragraph: "The overhead calculation shall apply to only the Contractor, Subcontractor, or Sub Tier Subcontractor actually performing the work using own workforce."
- 1.2.10 Add 1.2.10 Where there may be a conflict or discrepancy between the SU General Conditions/Supplementary Conditions and DIVISION 1 GENERAL REQUIREMENTS, the more stringent requirements shall be assumed to be required and shall be provided by the Contractor.
- 3.3 Add at the beginning of paragraph: "Unless identified elsewhere in the contract documents..."
- 5.5 Delete Article 5.5 Project Sign in its entirety.
- Delete this section in its entirety and replace with "The contractor shall be required to submit ten (10) digital progress images over the life of the project."
- 5.10 Delete Article 5.10 Security Services. Security Service is not required.
- 6.1 Temporary field office are not required for this project.
- 6.8.12 Add "or other tradesman" after the work "Electricians" (in the first line).
- 8.6.1 Add at the end "Liquidated Damages will be at the rate of \$1,000/Calendar day for the first 60 calendar days and \$2,500/Calendar day thereafter. Liquidated Damages will be applied stating the day after the contractually adjusted final completion date until the day actual final completion is reached and the final Certificate of Acceptance (CA) is issued by DCA."
- 8.9.1 Add the following: Upon issuance of the Notice to Proceed (NTP) the Contractor shall have 190 calendar days to Substantial Completion (SC) plus 20 calendar days from SC to Final Completion (FC). Total project duration shall not exceed 210 calendar days.
- 10.1.1 Add 10.1.1.1 "The Contractor Payment Process shall follow the procedure as outlined below unless modified by the SU and/or their representatives (SU reserves the right to make modifications to this procedure at any time):
  - a) At least 10 days before the date established for each progress payment deadline, the Contractor will submit for review by the Owner, and A/E an electronic pencil copy of this schedule of values showing work completed.
  - b) The Owner and A/E will review, make recommendations on the proposed pay request and forward back to the Contractor.

# SUPPLEMENTARY GENERAL CONDITIONS

- c) Upon acceptance, the Contractor will submit formal pay application with the required number of originals/copies and on the required forms/format with all required backup information to the A/E for review, approval and certification.
- 10.1.2 Add 10.1.2.1 "The Contractor shall provide a Schedule of Value Breakdown that includes the following, but not limited to General Conditions and other project costs:
  - a) Insurance/Bonding
  - b) Safety Protection
  - c) Building Cleanup and Dumpsters
  - d) Shop Drawing
- 10.1.3 Add 10.1.3.1 "Payment for materials and equipment stored off the site requires that certain conditions be met and that the following documentation be provided:
  - a) Copies of applicable "Bills of Sale"
  - b) Detailed list of quantity supplied and applicable unit prices and total value
  - c) A certificate of insurance which stipulates adequate coverage of materials and equipment during storage and transportation to the site;
  - d) An executed affidavit stating the exclusion purchase and storage of these materials and equipment for the job at hand;
  - e) A visual inspection of the materials and equipment on site by the owner and/or his representatives;
  - f) All materials of equipment to be stored shall be in bonded, third party warehouse only, and a receipt for the materials and equipment shall be issued in the name of the owner.
  - g) Material stored onsite may be billed provided they are stored and protected and must be verified by an invoice showing quantity and value of material. The stored "onsite materials" must be available for visual inspection and protected. The Contractor will not be relieved from protecting on-site material.
- 12.5 Add 12.5 SU Safety Manual. Refer to SU Safety Manual for more extensive safety requirements.
- 12.5.1 Add 12.5.1 Contractor shall comply with all sections.
- 14.2.6 Add the following:

Notwithstanding any other portion of this Contract, when the contract time is increased because of a change in the work, compensation for the Contractor's extended performance period shall be governed by the following:

a. Only changes in the work that cause a delay in the Project Critical Path completion date may be considered. All changes in the work causing delays to other elements of the work that is not impacting the Project Critical Path completion date will not be considered. All supporting documents as listed

# SUPPLEMENTARY GENERAL CONDITIONS

under Article 14.2 must be submitted for review and evaluation by the SU and A/E.

- b. The Contractor will receive No Monetary Compensation for the first 90 Aggregate Calendar Days of the extended performance period caused by a change in work. The Contractor will not be allowed to submit any cost for the field of main office staff or any other field or main office General Conditions cost related items. The first 90 Aggregate Calendar Days extension shall be in addition to those delays caused by events listed under Article 8.7.1.
- c. For delays caused by changes in the work, the Contractor will receive a maximum of \$1500 per calendar day for the extended performance period for every calendar day beyond the first 90 Aggregate Calendar Days. The maximum \$1500 limit includes all costs associated with the Contractor's field and main office staff and any other field or main office General Conditions cost related items. No other overhead and profit will be allowed to be added to the \$1500 per calendar day limit. All overhead and profit calculations for changes in the work will be as per Article 14.2.7
- d. General Conditions cost related items are, but not limited to, the cost of field office and field staff, main office and main office staff, trailer rentals, utility usage, vehicles, cleanup, storage, site maintenance, and toilets.
- e. Subcontractors and sub tier subcontractors of the Contractor will receive No Monetary Compensation for the extended performance period regardless of the length of the extended period. All overhead and profit calculations for changes in the work will be as per Article 14.2.6

# 14.2.7 Replace item a. with the following:

#### 14.2.7 a. Overhead with the sum of:

10 percent (10%) of the actual cost of work as defined in Section 1.1.11. Note: Costs for supervision, field office personnel (including superintendents, safety staff, and labor foreman), main office managers, supervisors, schedulers, estimators, purchasing agents, accountants, and administrative staff are only paid as part of the Overhead calculation of 10%. Only the Contractor, Subcontractor, or sub-tier Subcontractor performing the work is allowed the 10% overhead of cost. The General Contractor's overhead is 10% for only the portion of work performed by the Contractor's own workforce. For work performed by a subcontractor or sub tier subcontractor, the General Contractor is not allowed any overhead for supervision, field office staff, main office managers, supervisors, schedulers, estimators, purchasing agents, accountants, administrative staff or main office.

14.2.8 (b) Add at the end "Various Subcontractor's tiers are allowed 5% profit of cost of work performed with its own forces of their sub-tier Subcontractors."

#### **END OF SECTION**



# **STOCKTON UNIVERSITY**

# RENOVATIONS TO BUILDING 70 101 Vera King Farris Drive Galloway, New Jersey

**Technical Specifications** 

# **INDEX OF SPECIFICATIONS**

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26 24 19	MOTOR-CONTROL
26 28 13	FUSES ENCLOSED SWITCHES AND CIRCLIT DREAKERS
26 28 16	ENCLOSED SWITCHES AND CIRCUIT BREAKERS

REFER TO CONSTRUCITON DRAWINGS FOR ALL TECHNICAL SPECIFIATIONS RELATED TO STRUCTURAL.

#### **SECTION 01 00 00**

#### GENERAL REQUIREMENTS

1.0 **DESCRIPTION:** Work included in this project shall be for the

# RENOVATIONS TO BUILDING 70 STOCKTON UNIVERSITY

- 1.1 <u>LOCATION:</u> STOCKTON UNIVERSITY, 101 VERA KING FARRIS DRIVE, GALLOWAY, NJ
- 1.2 If there are any conflicts in the specifications the University's General Conditions would take precedence.
- 2.0 <u>CONTRACTOR'S RESPONSIBILITY:</u>
- 2.1 Once the project has been awarded, the General Contractor, his employees including subcontractors and their employees will each be required to coordinate with the Facility of Planning and Construction of Stockton University to gain access to the site and before the start of any work.
- 2.2 Verify all measurements and conditions in the field.
- 2.3 Before starting work, examine all adjoining work on which the work of these specifications depends. Perform corrective work to all existing conditions necessary to make these specifications perform in all respects.
- 2.4 APPLICABLE DOCUMENTS: Publications, specifications and standards listed in this Specification form a part of the Specification to the extent indicated by the reference thereto. Unless otherwise indicated, the issue of effect on the date of issuing the Invitation for bids shall apply.
- 2.5 **PROGRESS CHART:** Within ten (10) days of the receipt of Notice to Proceed and prior to commencement of work, the Contractor shall submit and receive approval for a Progress Chart indicating the planned starting and completion dates for all work items.
- 2.6 **PRICE SCHEDULE:** Along with the Progress Chart, the Contractor shall submit a price schedule for each work item, indicating his breakdown for labor, material, and equipment. Definitions applying are as follows:
  - 2.6.1 <u>LABOR COST</u>: Direct labor wages and benefits, labor insurance, supervisory labor, small hand tools chargeable to labor, prorated cost of job expenses such as field office and telephone, prorated percentage of general (main office) overhead and percentage of profit.
  - 2.6.2 <u>MATERIAL COST:</u> Direct material costs delivered to the site, prorated percentage of job expenses, general overhead, and profit.

- 2.6.3 **EQUIPMENT COST:** Plant and equipment charges, prorated percentage of job expenses, general overhead, and profit.
- 2.7 <u>INTENT OF DRAWINGS AND SPECIFICATIONS:</u> The intent of the drawings and specifications is to provide for the completion of the work in every detail that is described therein. The Contractor shall furnish all labor; materials, equipment, tools, transportation, and necessary supplies such as may be reasonably required to complete the work in accordance with the drawings.
- 2.8 **REPAIR OF EXISTING WORK:** The work shall be carefully laid out in advance. Where cutting or patching surfaces is necessary for proper installation, the work shall be carefully done by skilled mechanics. Any damage to the building or equipment caused by the Contractor shall be repaired by skilled mechanics of the trades involved, at no additional costs to the Owner. The Contractor shall patch and refinish all damaged surfaces caused by this work so as to match adjacent surfaces in material, texture, and color to the satisfaction of the Architect.

# 2.9 **MATERIALS APPROVED:**

- 2.9.1 Catalog cuts and other information shall be submitted by the Contractor as required herein and as necessary to secure approval of the material and methods to be incorporated into the work.
- 2.9.2 Four (4) copies of catalogs and other printed information shall be submitted. One (1) copy of printed matter will be returned to the Contractor for his use.
- 2.9.3 All submittals shall be made using the "Shop Drawing/Material Approval Request" form. Submittals shall be numbered sequentially and shall include the information required.
- 2.9.4 Within ten (10) days after receipt of Notice to Proceed, the Contractor shall submit a submittals log indicating all required submittals and dates to be submitted.

#### 3.0 METHODS OF MATERIAL QUALIFICATION:

- 3.0.1 Each material and product can be incorporated into the work and shall conform to the specifications. The Contractor may use any of the following methods to demonstrate compliance with the specifications except as otherwise required.
- 3.0.2 Certificates of Compliance with specification requirements signed by an authorized officer of the manufacturer, processor or approved trade association involved. Such certificates shall show the name and address of the Contractor and the name and location of the project.
- 3.0.3 All materials shall be installed as per manufacturer guide specifications.
- 3.0.4 Labeling by the manufacturer on unbroken and unopened containers.
- 3.0.5 Official marking or labeling by recognized grading organization or national code association indicating compliance.

# 3.1 **DELIVERY, STORAGE, AND HANDLINGS:**

- 3.1.1 Deliver materials to the job site in the manufacturer's sealed and undamaged containers or wrappings.
- 3.1.2 Each product delivered shall be identified with the manufacture's name, date of manufacture, lot name and trade name.
- 3.1.3 Store materials up off the ground under cover, protected from weather and construction activities.
- 3.1.4 The Contractor shall store all material on the job site at his own risk. The Owner will not be responsible for any lost material.
- 3.2 **PRECONSTRUCTION MEETING:** A preconstruction meeting is required and will be arranged for some convenient date after contract award, but before the start of site work.
- 4.0 **INSPECTION:** The Contractor shall keep the Architect fully informed of contract operations and plans so that he may arrange to be present at various times when work is being performed.
- 5.0 HOURS OF WORK: All construction operations shall be performed between the hours of 7:00 a.m. and 3:30 p.m. local time, Monday through Friday inclusive, pending approved schedule by owner. If the Contractor desires to carry on work outside of these hours, he shall submit an application to the Owner for approval at least seventy-two (72) hours in advance. No such work outside the regular hours established above shall be undertaken without approval of the Owner and at no additional cost to the Owner.
- 6.0 <u>UTILITIES:</u> Electricity and water, as available, will be furnished by the Owner for construction purposes at no cost, provided that these utilities are not overloaded.
- 7.0 **TEMPORARY TOILET FACILITIES:** Shall be provided and maintained by the Contractor.
- 8.0 **REMOVAL:** All material and debris removed shall become the property of the Contractor and shall be removed from the site during and after the work. Debris and waste material shall not be discharged into surrounding area. None of the materials being removed may be reused, except as noted on the drawings. All debris removed shall be properly disposed of in approved sites.
- 9.0 **SAFETY BARRICADE:** Provide steel tubular scaffold system with 3" thick wood boards to allow a protected route of travel from all exits. Protective scaffolding shall extend a minimum of 8' from face of building; provide construction fencing around site 6' high chain link.

#### 10.0 MANUFACTURER'S REPRESENTATIVE'S RESPONSIBILITIES:

- 10.0.1 Keeping the Architect informed on a periodic basis as to the progress and quality of the work.
- 10.0.2 Calling to the attention of the Contractor those matters which he considers to be in violation of the contract requirements.
- 10.0.3 Reporting to the Architect any failure or refusal of the Contractor to correct unacceptable practices.

- 10.0.4 Conducting preliminary and subsequent job site meetings with the Contractor's official job representative.
- 10.0.5 Rendering any other inspection services which the Architect may designate.
- 10.0.6 Inspecting, after completion of work, the extent to which the Contractor has complied with these specifications.
- 10.0.7 The presence and activities of the manufacturers and the Architect shall in no way relieve the Contractor of his contractual responsibilities.
- 11.0 **TEMPORARY TRAILERS:** Not required.
- 12.0 **ENCLOSURES AND FENCING:** At staging area.
- 13.0 **WORK PERFORMED:** The General Contractor shall certify that a minimum of 25% of the work shall be performed by his direct staff, not sub-contractors.

**END OF SECTION** 

#### **SECTION 01 10 00**

#### **SUMMARY**

#### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Contract description.
- B. Work by Owner.
- C. Contractor's use of site and premises.
- D. Work sequence.
- E. Owner occupancy.
- F. Specification Conventions.

#### 1.2 CONTRACT DESCRIPTION

- A. At the Galloway Campus, Stockton University seeks to make renovations to the existing HVAC system at Building 70, refer to drawings and specifications for additional information.
- B. Perform Work of Contract under fixed cost contract with Owner in accordance with Conditions of Contract.

#### 1.3 WORK BY OWNER

- A. Work under this contract includes:
  - 1. See construction drawings for a list of work by Owner.

#### 1.4 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Limit use of site and premises to allow:
  - 1. Owner occupancy.
  - 2. Work by Others.
  - 3. Use of site and premises by the public.
- B. Emergency Building Exits during Construction.

# 1.5 WORK SEQUENCE

A. Construct Work in phases to accommodate Owner's occupancy requirements during construction period, coordinate construction schedule and operations with Owner.

# 1.6 OWNER OCCUPANCY

- A. The Owner will occupy the premises during the entire period of the construction phase of construction.
- B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

#### 1.7 SPECIFICATION CONVENTIONS

A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

END OF SECTION

#### SECTION 01 20 00

#### PRICE AND PAYMENT PROCEDURES

# PART 1 GENERAL

# 1.1 SECTION INCLUDES

- A. Cash allowances.
- B. Contingency allowances.
- C. Testing and inspection allowances.
- D. Schedule of values.
- E. Applications for payment.
- F. Change procedures.
- G. Defect assessment.
- H. Unit prices.
- I. Alternates.

#### 1.2 CASH ALLOWANCES – FOR PERMITS

- A. All Permit fees are by owner
- B. All monies not used for permits shall be credited to the Owner as part of the last application for payment.
- C. Differences in costs will be adjusted by Change Order.
- D. Allowances Schedule: check bid schedule and other sections of the specification.

#### 1.3 CONTINGENCY ALLOWANCES

- A. Include in the Base Bid Contract, a stipulated sum/price, as indicated in Specification Section 01 21 00 "Allowances" for use upon Owner's instruction for unforeseen items. Any unused funds are to be credited back to the owner.
- B. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

#### 1.4 TESTING AND INSPECTION ALLOWANCES

A. Provided by owner except as noted in other sections of the specification.

B. Differences in cost will be adjusted by Change Order.

#### 1.5 SCHEDULE OF VALUES

- A. Submit printed schedule on AIA Form G703 Continuation Sheet for G702 standard form.
- B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement established in Notice to Proceed.
- C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify site mobilization, bonds and insurance, close out, and separate lines for material and labor where applicable.
- D. Include in each line item, amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for each item.
- E. Include separately from each line item, direct proportional amount of Contractor's overhead and profit.
- F. Revise schedule to list approved Change Orders, with each Application for Payment.

#### 1.6 APPLICATIONS FOR PAYMENT

- A. 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.
  - 4. Products list.
  - 5. Schedule of unit prices.
  - 6. Submittals Schedule.
  - 7. List of Contractor's staff assignments.
  - 8. List of Contractor's principal consultants.
  - 9. Copies of building permits.
  - 10. Initial progress report.
  - 11. Certificate of insurance and insurance policies.
  - 12. Performance and payment bonds.
- B. Final Payment Application: 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. Completion of punchlist items.
  - 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  - 4. Updated final statement, accounting for final changes to the Contract Sum.

- 5. Transmittal of required Project Construction records to the Owner.
- 6. Removal of temporary facilities, services, surplus materials, debris, etc.
- 7. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
- 8. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
- 9. AIA Document G707, "Consent of Surety to Final Payment."
- 10. Evidence that claims have been settled.
- 11. Original County Voucher form marked "Final Payment".
- 12. Final, liquidated damages settlement statement.
- 13. Prevailing Wage Rate Statement.
- 14. One (1) year 100% Maintenance Bond.
- 15. All Operation and Maintenance Manuals, Warrantees and Guarantees.
- C. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- D. Submit updated monthly construction schedule with each Application for Payment.
- E. Payment Period: Submit at intervals stipulated in the Agreement.
- F. Submit with transmittal letter as specified for Submittals in Section 01 33 00 Submittal Procedures.
- G. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
  - 1. Current construction photographs.
  - 2. Partial release of liens from major subcontractors and vendors.
  - 3. Record documents for review by Owner which will be returned to Contractor.
  - 4. Affidavits attesting to off-site stored products.
  - 5. Construction progress schedules revised and current as specified.
- H. The application for payment shall be used by the Owner as a guide for payments based on work completed, with no deviations once payments have started.

#### 1.7 CHANGE PROCEDURES

- A. Submittals: Submit name of individual authorized to receive change documents and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. The Architect/Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on AIA Form G710.
- C. The Architect/Engineer may issue a Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with stipulation of overtime work required and the period of time during which the requested price will be considered valid]. Contractor will prepare and submit estimate within ten days.

- D. Contractor may propose changes by submitting a request for change to Architect/Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation [and a statement describing effect on Work by separate or other Contractors]. Document requested substitutions in accordance with specification.
- E. Stipulated Sum/Price Change Order: Based on Notice of Change and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer.
- F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work, which are not pre-determined, execute Work under Construction Change Directive. Work Directive Change. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.
- G. Construction Change Directive Work Directive Change: Architect/Engineer may issue directive, on AIA Form G713 Construction Change Directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
- H. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract.
   Architect/Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
- I. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- J. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.
- K. Change Order Forms: AIA G701 Change Order.
- L. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
- M. Correlation of Contractor Submittals:
  - 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
  - 2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
  - 3. Promptly enter changes in Project Record Documents.

4. See General Conditions and Supplementary General Conditions of the Contract for Construction for further information on 1%-line item for Close Out Documentation, and Overhead, Profit and Bonding

#### 1.8 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Architect/Engineer it is not practical to remove and replace the Work, the Architect/Engineer will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but unit sum/price will be 50 percent at discretion of Architect/Engineer.
- D. Defective Work will be partially repaired to instructions of Architect/Engineer and unit sum/price will be reduced 50 percent at discretion of Architect/Engineer.
- E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Architect/Engineer to assess defects and identify payment adjustments, is final.
- G. Non-Payment for Rejected Products: Payment will not be made for rejected products for any of the following:
  - 1. Products wasted or disposed of in a manner that is not acceptable.
  - 2. Products determined as unacceptable before or after placement.
  - 3. Products not completely unloaded from transporting vehicle.
  - 4. Products placed beyond lines and levels of required Work.
  - 5. Products remaining on hand after completion of the Work.
  - 6. Loading, hauling, and disposing of rejected products.

END OF SECTION

#### **SECTION 01 21 00**

#### **ALLOWANCES**

#### 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 administrative and procedural requirements governing allowances.
  - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
  - 1. Lump-sum allowances.

#### 1.3 SELECTION AND PURCHASE

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

#### 1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

# 1.5 COORDINATION

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

# 1.6 LUMP-SUM, UNIT-COST AND QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include freight, and delivery to Project site. Do not include taxes.
- B. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

# 1.7 UNUSED MATERIALS

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted. Re-stocking charges will be credited to the Contractor only upon submission to the Architect of written documentation on material supplier's invoice or letterhead evidencing amount charged.
  - 1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

# PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

# 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

# 3.3 SCHEDULE OF ALLOWANCES

A. Allowance AL-1: Contingency Allowance: The Contractor shall include Fifty Thousand Dollars (\$50,000.00) in its base bid to address unforeseen conditions and / or minor scope

adjustments that may be encountered or arise during the project. No work shall be billed against the Allowance without prior written approval from the Owner and the Contractor is obligated to substantiate in detail costs incurred for allowance work. Unused portions of this allowance shall be credited back to the owner against the Lump Sum Bid Amount at the completion of the project.

**END OF SECTIONSP** 

## **SECTION 01 30 00**

## ADMINISTRATIVE REQUIREMENTS

#### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Pre-installation meetings.
- F. Cutting and patching.
- G. Special procedures.

# 1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

#### 1.3 PRECONSTRUCTION MEETING

- A. Owner will schedule meeting after Notice of Award.
- B. Attendance Required: Owner, Architect and Contractor.
- C. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.
  - 4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
  - 5. Designation of personnel representing parties in Contract and Architect.
  - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 7. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner and those affected by decisions made.

#### 1.4 SITE MOBILIZATION MEETING

- A. Architect will schedule meeting at Project site prior to Contractor occupancy.
- B. Attendance Required: Owner, Architect, Special Consultants, and Contractor, Contractor's Superintendent and major Subcontractors.
- C. Agenda:
  - 1. Use of premises by Owner and Contractor.
  - 2. Owner's requirements.
  - 3. Construction facilities and controls provided by Owner.
  - 4. Temporary utilities provided by Owner.
  - 5. Schedules.
  - 6. Application for payment procedures.
  - 7. Procedures for testing.
  - 8. Procedures for maintaining record documents.
  - 9. Requirements for start-up of equipment.
  - 10. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner and those affected by decisions made.

#### 1.5 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum bimonthly intervals.

- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner and Architect, as appropriate to agenda topics for each meeting.

# D. Agenda:

- 1. Review minutes of previous meetings.
- 2. Review of Work progress.
- 3. Field observations, problems, and decisions.
- 4. Identification of problems impeding planned progress.
- 5. Review of submittals schedule and status of submittals.
- 6. Review of off-site fabrication and delivery schedules.
- 7. Maintenance of progress schedule.
- 8. Corrective measures to regain projected schedules.
- 9. Planned progress during succeeding work period.
- 10. Coordination of projected progress.
- 11. Maintenance of quality and work standards.
- 12. Effect of proposed changes on progress schedule and coordination.
- 13. Other business relating to Work.
- E. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner and those affected by decisions made.

#### 1.6 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.
- B. Require attendance of parties directly affecting, or affected by, Work of specific section.
- C. Notify Architect/Engineer four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of installation, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner and those affected by decisions made.

# **PART 2 EXECUTION**

# 2.1 CUTTING AND PATCHING

# A. RELATED DOCUMENTS

1. Drawings and General Provisions of Contract, including but not limited to, General and Supplementary Conditions and other Division 1, Specification Sections, apply to work of this Section.

# B. DESCRIPTION OF WORK

- 1. Definitions: "Cutting and Patching" includes cutting into existing construction to provide for the installation or performance of other Work and subsequent fitting and patching required to restore surfaces to their original conditions.
- 2. "Cutting and Patching" is performed for coordination of the Work, to uncover work for access or inspection, to obtain samples for testing, to permit alternations to be performed, or for other similar purposes.
- 3. Cutting and Patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to the "Cutting and Patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "Cutting and Patching".

# C. QUALITY ASSURANCE

- 1. Requirements for Structural Work: Do not cut and patch structural work without prior approval of a structural engineer.
- 2. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased safety.

# D. SUBMITTALS

- 1. Procedural Proposal for Cutting and Patching: Where prior approval of cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as applicable, in the submittal.
- 2. List products to be used and firms that will perform work.
- 3. Give dates when work is expected to be performed.
- 4. List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that will be out-of-service temporarily. Indicate how long utility service will be disrupted.
- 5. Approval by the Design Consultant or Project Management Firm to proceed with cutting and patching work does not waive the Design Consultant's or Project Management Firm's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

# E. MATERIALS

1. General: Except as otherwise indicated, or as directed by the Design Consultant or Project Management Firm, use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

# F. INSPECTION

1. Before cutting, examine the surface to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered notify Project Management Firm immediately. Execute cutting (including excavation) fitting or patching of work required to: make several parts fit properly; uncover work to provide for installation or ill-timed work; remove and replace defective work; remove and replace work not conforming to requirements of Contract Documents.

#### G. PREPARATION

- 1. Temporary Support: To prevent failure provide temporary support of work to be cut.
- 2. Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.

#### H. PERFORMANCE

- 1. General: Except as otherwise indicated or as approved by the Design Consultant or Project Management Firm, proceed with cutting and patching at the earliest feasible time and complete work without delay.
- 2. Cutting: Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible review proposed procedures with the original installer; comply with original installer's recommendations.
- 3. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.
- 4. Comply with requirements of applicable Sections of Division 2 where cutting and patching require excavating and backfilling.
- 5. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

- 6. Where feasible, inspect and test patched areas to demonstrate integrity of work.
- 7. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.
- 8. Where removal of walls or partitions extends one finished area into another finished area, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance, remove existing floor and wall coverings and replace with new materials.
- 9. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coat.

# I. CLEANING

1. Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely, point mortar, oils, putty, and items of similar nature. Thoroughly clean piping, conduit, and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition

# 2.2 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Prepare surface and remove surface finishes to permit installation of new work and finishes.
- G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- H. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original condition.
- I. Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with neat transition to adjacent finishes. Coordinate with construction documents.

- J. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- K. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Architect/Engineer for review.
- L. Where change of plane of 1/4 inch or more occurs, request instructions from Architect/Engineer.
- M. Trim existing doors to clear new floor finish. Refinish trim to original condition. Coordinate with construction documents.
- N. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- O. Finish surfaces as specified in individual product sections.

END OF SECTION

#### **SECTION 01 32 16**

#### CONSTRUCTION SCHEDULE

#### 1.0 GENERAL:

# 1.1 DESCRIPTION:

- 1.1.1 Work Included: To assure adequate planning and execution of the work so that the work is completed within the number of calendar days allowed in the contract, and to assist the Owner in appraising the reasonableness of the proposed schedule and in evaluating progress of the work, prepare and maintain the schedules and reports described in this section.
- 1.1.2 Definitions: "Day" used throughout the contract, unless otherwise stated, means "Calendar Day".

# 1.2 **QUALITY ASSURANCE:**

- 1.2.1 Qualifications of Scheduling Personnel: Employ a scheduler who is thoroughly trained and experienced in compiling construction schedule data, in analyzing by use of Critical Path Method or PERT, and in preparation and issue of periodic reports as required below.
- 1.2.2 Reference Standards: Perform all data preparation, analysis, charting and updating in accordance with all recommendations contained in the current edition of "CPM in Construction" Manual of Associate General Contractors, or in accordance with other standards approved by the State.
- 1.2.3 Reliance Upon Approved Schedule:
- 1.2.4 The construction schedule as approved by the Owner will be an integral part of the Contract and will establish interim Contract Completion dates for the various activities.
- 1.2.5 Should any activity not be completed within fifteen (15) days after the stated scheduled date, the Owner shall have the right to order the Contractor to expedite completion of the activity by whatever means the Owner deems appropriate and necessary, without additional compensation to the Contractor.
- 1.2.6 Should any activity be thirty (30) or more days behind schedule, the Owner shall have the right to perform the activity or have activity performed by whatever method the Owner deems appropriate.
- 1.2.7 Costs incurred by the Owner in connection with expediting construction activity under this Article shall be reimbursed to the Owner by the Contractor.
- 1.2.8 It is expressly understood and agreed that failure by the Owner to exercise the option to either order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered precedent setting for any other activities.

# 1.3 SUBMITTALS:

- 1.3.1 General: Comply with the provisions of Section 013000.
- 1.3.2 Preliminary Analysis: Within ten (10) days after receipt of Notice to Proceed, submit one (1) reproducible copy and four (4) prints of a preliminary construction schedule, plus four (4) prints of proposed format or Materials Status Reports, prepared in accordance with Part Three of this Section.
- 1.3.3 Construction Schedule: Within twenty (20) days after receipt of Notice to Proceed, submit one (1) reproducible and four (4) prints of construction schedule prepared in accordance with Part Three of this Section. Update the construction schedule on a monthly basis.
- 1.3.4 Periodic Report:
- 1.3.5 On the first working day of each month following submittal described in Paragraph 1.3 above, submit four (4) prints of the construction schedule updated as described in Part Three of this Section.
- 1.3.6 Accompanying each periodic submittal of construction schedule, submit four (4) prints of the Materials Status Reports updated as described in Part Three of this Section.

# 2.0 PRODUCTS:

# 2.1 <u>CONSTRUCTION ANALYSIS:</u>

- 2.1.1 Diagram: Graphically show the order and interdependence of all activities necessary to complete the work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram. Activities shown on the diagram shall include, but are not necessarily limited to:
  - a. Project mobilization;
  - b. Submittals and approvals of Shop Drawings and Samples;
  - c. Procurement of equipment and critical materials;
  - d. Fabrication of special material and equipment, and their installation and testing;
  - e. Final cleanup;
  - f. Final inspection and testing;
  - g. All activities by the governing agencies that affect progress, required dates for completion, or both, for all and for each part of the work.
- 2.1.2 The detail of information shall be such that duration times of activities shall normally range from one (1) to fifteen (15) days. The selection and number of activities shall be subject to the Owner's approval.
- 2.1.3 Show on the diagram, as a minimum for each activity, preceding and following event numbers, description of each activity, cost, and activity duration in calendar days. Submit diagram on a sheet 75 cm (30") high by the width required.

- 2.2 Mathematical Analysis: Furnish a mathematical analysis of the diagram by manual or computer-aided means, including a tabulation of each activity. Show the following information as a minimum for each activity:
  - a. Preceding and following event number;
  - b. Activity descriptions;
  - c. Earliest start date (by calendar date);
  - d. Latest start date (by calendar date);
  - e. Earliest finish date (by calendar date);
  - f. Latest finish date (by calendar date);
  - g. Slack or float (by calendar days);
  - h. Monetary value of the activity;
  - i. Percentage of activity completed;
  - j. Contractor's earnings based on portion of activity completed.
  - 2.2.1 The means used in making the mathematical analysis shall be capable of compiling the total value of completed and partially completed activities and be capable of accepting modifications approved for time and logic adjustments.
- 2.3 Periodic Reports: If computer-aided means are used, list the activities in computer printout sorts as follows:
  - a. By the preceding event number from lowest to highest, and then in order of the following event numbers;
  - b. By the amount of float, then in order of preceding event numbers, and then in order of succeeding event numbers.
  - c. In order of preceding event numbers, and then in order of succeeding event numbers (show the dollar amount and dollars spent to date for each activity);
  - d. Other sorts requested by the Owner, for which the Contractor will be reimbursed in accordance with the General Conditions provisions for "Changes."

# 2.4 <u>MATERIAL STATUS REPORTS:</u>

- 2.4.1 Format: The Contractor's standard materials status report form will be acceptable if, in Architect's judgment, it provides sufficient pertinent data to determine that materials procurement flow is adequate for all needs of the work.
- 2.4.2 Content: Show at least the following information:
- 2.4.3 Item Description, listed in accordance with Specifications Section Number in which the item is called for:
- 2.4.4 Purchase Order Number and Date of Issue:
- 2.4.5 Vendor Name:
- 2.4.6 Date Shipped and Shipping Means Utilized:
- 2.4.7 Estimated Date of Arrival at Job Site.

- 2.4.8 Actual Date of Arrival at Job Site and Receiving Report Number.
- 2.5 Data Processing: Process the data by manual or computer-aided methods, but to a degree of promptness and accuracy assuring complete display of all pertinent current information at date of each periodic report.

# 3.0 EXECUTION:

### 3.1 PRELIMINARY ANALYSIS:

- 3.1.1 Contents:
  - a. Show all activities of the Contractor under this work for the period between receipt of Notice to Proceed and Submittal of Construction Schedule required as noted above.
  - b. Show the Contractor's general approach to remainder of the work.
  - c. Show cost of all activities scheduled for performance before submittal and approval of the construction schedule.
- 3.1.2 Submittals shall be in accordance with Paragraphs.
- 3.2 <u>CONSTRUCTION SCHEDULE:</u> As soon as practicable after receipt of Notice to Proceed, complete the Construction Analysis described in Article 2.1 above, in preliminary form. Meet with the Architect, review contents of proposed construction schedule, and make all revisions agreed upon. Submit in accordance with Paragraph 1.3 above.
  - 3.2.1 Schedule Information:

a. Notice to Proceed (NTP) - TBD

b. Substantial Completion (SC) - 190 Calendar Days from NTP

c. Final Completion (FC) - 20 Calendar Days from SC

d. Project Duration - 210 Calendar Days

- 3.3 <u>MATERIAL STATUS REPORT:</u> As soon as practicable after receipt of Notice to Proceed, meet with the State, review contents of proposed Materials Status Reports, and make all revisions to format agreed upon.
- 3.4 <u>PERIODIC REPORTS:</u>
  - 3.4.1 Construction Schedule, Contents:
    - e. Report actual progress by updating the mathematical analysis.
    - f. Note on the summary report, or clearly show on a revised issue of affected portions of the detailed diagram, all revisions causing changes in the detailed program.
    - g. Revise the summary report as necessary for clarity.
    - h. Show activities or portions of activities completed during the reporting period and their actual value.
    - i. State the percentage of work actually completed and schedule as the report date, and the progress along the critical path in terms of days ahead of or behind the allowable dates.
    - j. If the work is behind schedule, also report progress along other paths with negative slack.

- k. Include a narrative report which shows, but is not necessarily limited to:
  - i. A description of the problem areas, current and anticipated;
  - ii. Delaying factors, and their impact;
  - iii. An explanation of corrective actions taken or proposed.
- 3.4.2 Show the date of latest revision. Submit in accordance with the provisions above.
- 3.5 Materials Status Reports:
  - 3.5.1 On the letter of transmittal accompanying periodic reports, on an accompanying summary sheet, or by other means acceptable to the Architect, clearly indicate those items the delivery of which are critically overdue or otherwise hazardous to maintenance of the approved schedule.
  - 3.5.2 Submit in accordance with the provisions above.
- 3.6 <u>REVISIONS:</u> Make only those revisions to approved Construction Schedule and approved Materials Status Reports as are approved in advance by the Architect.
- 4.0 <u>SUBMISSION:</u> A progress schedule shall be updated monthly by the General Contractor, with coordination of the other prime contractors (as required). This updated schedule shall be submitted to the Architect at the first job meeting and each meeting thereafter. If schedule is not submitted, request for payment may be withheld.

END OF SECTION

#### **SECTION 01 33 00**

#### SUBMITTAL PROCEDURES

#### PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Product data.
- E. Shop drawings.
- F. Samples.
- G. Design data.
- H. Test reports.
- I. Certificates.
- J. Manufacturer's instructions.
- K. Manufacturer's field reports.
- L. Erection drawings.

# 1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with AIA Form G810.
- B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- C. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite Project, and deliver to Architect at business address. Coordinate submission of related items.
- F. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.

- G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
- H. Allow space on submittals for Contractor and Architect review stamps.
- I. When revised for resubmission, identify changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- K. Submittals not requested will not be recognized or processed.

# 1.3 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedules within 15 days after date of Owner-Contractor Agreement. After review, resubmit required revised data within ten days.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers and other concerned parties.
- D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- E. Submit computer generated horizontal bar chart with separate line for each section of Work, identifying first work day of each week.
- F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.
- G. Indicate estimated percentage of completion for each item of Work at each submission.
- H. Submit separate schedule of submittal dates for shop drawings, product data and samples, including dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.
- I. Revisions To Schedules:
  - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
  - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
  - 3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect.

#### 1.4 PROPOSED PRODUCTS LIST

A. Within 15 days after date of Owner-Contractor Agreement, submit list of major products proposed for use as indicated on drawings and specifications, with name of manufacturer, trade name, model number of each product and specification section.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation and reference standards.

# 1.5 PRODUCT DATA

- A. Product Data: Submit to Architect for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of copies Contractor requires, plus two copies Architect will retain.
- C. Mark each copy to identify applicable products, models, options, and other data.

  Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 017000.

#### 1.6 SHOP DRAWINGS

- A. Shop Drawings: Submit to Architect for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
  - 1. Include signed and sealed calculations to support design.
  - 2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
  - 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D.
- 1. Submit number of opaque reproductions Contractor requires, plus two copies Architect will retain
- 2. Shop drawing review is based on submission of specified items as indicated in the construction documents and specifications. Product substitutions are allowed and must be substantiated and verified by filling out Yezzi Associates "Proposed Substitution Certification" form included in the bid submission package.

  Architects shop drawing review is limited to one submission per product subsequent submission and review time for same product or substitution review time incurred by the architect will be billed to the general contractor at a rate of \$100/hr. Additional review time due to resubmissions specifically requested by

the architect in order to finalize product submission and conformance with construction documents and design intent will not incur any additional charges.

E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 017000.

#### 1.7 SAMPLES

- A. Samples: Submit to Architect for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Samples For Selection as Specified in Product Sections:
  - 1. Submit to Architect for aesthetic, color or finish selection.
  - 2. Submit samples of finishes from full range of manufacturers' standard colors, textures and patterns for Architect selection.
- C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- D. Include identification on each sample, with full Project information.
- E. Submit number of samples specified in individual specification sections; Architect will retain one sample.
- F. Reviewed samples which may be used in the Work are indicated in individual specification sections.
- G. Samples will not be used for testing purposes unless specifically stated in specification section.
- H. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 017000.

# 1.8 DESIGN DATA

- A. Submit for Architect's knowledge as contract administrator or for Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

## 1.9 TEST REPORTS

- A. Submit for Architect's knowledge as contract administrator or for Owner.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

# 1.10 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

### 1.11 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting and finishing, to Architect for delivery to Owner in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

# 1.12 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for Architect's benefit as contract administrator or for Owner.
- B. Submit report in duplicate within 5 days of observation to Architect for information.
- C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

## 1.13 ERECTION DRAWINGS

- A. Submit drawings for Architect's benefit as contract administrator or for Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

END OF SECTION

#### **SECTION 01 33 23**

# SHOP DRAWINGS, PRODUCT DATA, SAMPLES & PHOTOGRAPHS

# 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 work of this section.

# 1.2 DESCRIPTION OF REQUIREMENTS

- A. General: This section specifies procedural requirements for non-administrative submittals including shop drawings, product data, samples and other miscellaneous work-related submittals. Shop drawings, product data, samples and other work-related submittals are required to amplify, expand and coordinate the information contained in the Contract Documents.
- B. Refer to other Division-1 Sections and other contract documents for specifications on administrative, non-work-related submittals. Such submittals include, but are not limited to the following items:
  - 1. Permits
  - 2. Payment applications
  - 3. Performance and payment bonds.
  - 4. Insurance certificates
  - 5. Inspection and test reports
  - 6. Schedule of values
  - 7. Progress reports
  - 8. Listing of subcontractors.
- C. Shop drawings are technical drawings and data that have been specially prepared for this project, including but not limited to the following items:
  - 1. Fabrication and installation drawings
  - 2. Setting diagrams
  - 3. Shopwork manufacturing instructions
  - 4. Templates
  - 5. Patterns
  - 6. Coordination drawings (for use on-site)
  - 7. Schedules
  - 8. Design mix formulas
  - 9. Contractor's engineering calculations
- D. Standard information prepared without specified reference to a project is not considered to be shop drawings.

- E. Product data includes standard printed information on manufactured products that has not been specially-prepared for this project, including but not limited to the following items:
  - 1. Manufacturer's product specifications and installation instructions.
  - 2. Standard color charts.
  - 3. Catalog cuts
  - 4. Roughing-in diagram and templates
  - 5. Standard wiring diagrams
  - 6. Printed performance curves
  - 7. Operational range diagrams
  - 8. Mill reports
  - 9. Standard product operating and maintenance manuals
- F. Samples are physical examples of work, including but not limited to the following items.
  - 1. Partial sections of manufactured or fabricated work
  - 2. Small cuts or containers of materials
  - 3. Complete units of repetitively-used materials
  - 4. Swatches showing color, texture and pattern
  - 5. Color range sets
  - 6. Units of work to be used for independent inspection and testing
- G. Mock-ups are special forms of samples, which are too large or otherwise inconvenient for handling in the manner specified for transmittal of sample submittals.
- H. Miscellaneous submittals are work-related, non-administrative submittals that do not fit in the three previous categories, including, but not limited to the following:
  - 1. Specially-prepared and standard printed warranties
  - 2. Maintenance agreements
  - 3. Workmanship bonds
  - 4. Survey data and reports
  - 5. Project photographs
  - 6. Testing and certification reports
  - 7. Record drawings
  - 8. Field measurement data
  - 9. Operating and maintenance manuals
  - 10. Keys and other security protection devices
  - 11. Overrun stock

# 1.3 SUBMITTAL PROCEDURES:

- A. General: Refer to the General Conditions for basic procedures for submittal handling.
  - 1. Coordination: Coordinate the preparation and processing of submittals with the performance of the work. Coordinate each separate submittal with other

submittals and related activities such as testing, purchasing fabrication, delivery and similar activities that require sequential activity.

Coordinate the submittal of different units of interrelated work so that one submittal will not be delayed by the Architect/Engineer's need to review a related submittal requiring coordination with other submittals until related submittals are forthcoming.

- 2. Coordination of Submittal Times: Prepare and transmit all submittals to the architect/Engineer within seven (7) days of Notice of Award Notice to Proceed period. Transmit different kinds of submittals for the same unit of work so that processing will not be delayed by the Architect/Engineer's need to review submittals concurrently for coordination.
- 3. Review Time: Allow sufficient time within the fourteen (14) days period so that the installation will not be delayed as a result of the time required to properly process submittals, including time for re-submittal, if necessary. Advise the Architect/Engineer on each submittal, as to whether processing time is critical to the progress of the work, and if the work would be expedited if processing time could be shortened.

Allow two weeks for the Architect/Engineer's initial processing of each submittal. Allow a longer time period where processing must be delayed for coordination with subsequent submittals. The architect/Engineer will advice the contractor promptly when it is determined that a submittal being processed must be delayed for coordination.

No extension of time will be authorized because of the contractor's failure to transmit submittals to the Architect/Engineer sufficiently in advance of the work.

- 4. Submittal Preparation: Mark each submittal with a permanent label for identification. Provide the following information on the label for proper processing and recording of action taken.
  - a. Project name
  - b. Date
  - c. Name and address of Contractor
  - d. Name and address of sub-contractor
  - e. Name and address of supplier
  - f. Name of manufacturer
  - g. Number and title of appropriate specification section
  - h. Drawing number and detail references, as appropriate
  - i. Similar definitive information as necessary

Provide a space on the label for the Contractor review and approval markings, and a space for the Architect/Engineer's "Action" marking.

5. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the architect/Engineer, and to other destinations as indicated, by use of a transmittal form. Submittals

received from sources other than the Contractor will be returned to the sender "without action".

- 6. Transmittal Form: Provide on the form places for the following information:
  - a. Project name
  - b. Date
  - To c.
  - d. From
  - Category and type of submittal e.
  - Submittal purpose and description f.
  - Submittal and transmittal distribution records g.
  - Signature of transmitter h.

Contractor's certification stating that the information submitted complies with the requirements of the Contract Documents, with a place for the Contractor's signature.

Record relevant information and requests for data on the transmittal form. On the transmittal form, or on a separate sheet attached to the form, record deviations from the requirements of the Contract Documents, if any, including minor variations and limitations.

#### 1.4 SPECIFIC SUBMITTAL REQUIREMENTS:

A. General: Specific submittal requirements for individual units of work are specified in the applicable specification section. Except as otherwise indicated in the individual specification sections, comply with the requirements specified herein for each type of submittal.

Where it is necessary to provide intermediate submittals between the initial and final submittals, provide and process intermediate submittals in the same manner as for initial submittals.

B. Shop Drawings: Information required on shop drawings includes, dimensions, identification of specific products and materials, which are included in the work, compliance with specified standards and notations of coordination requirements with other work. Provide special notation of dimensions that have been established by field measurement. Deviations, modifications, additions or deletions from the contract documents must be specifically called out on the shop drawings by way of a cloud, note or request for review or clarification.

Refer to Division-23 and Division-26 sections for additional general requirements applicable to shop drawings for mechanical and electrical work, respectively.

Do not permit shop drawings copies without an appropriate final "Action" marking by the Architect/Engineer to be used in connection with the work.

Preparation: Submit newly prepared information, drawn to accurate scale on sheets not less than 8-1/2" x 11"; except for actual pattern or template type drawings, the maximum sheet size shall not exceed 36" x 48". Indicate the name of the firm that

prepared each shop drawing and provide appropriate project identification in the title block. Provide a space not less than 20 sq. in. beside the title block for marking the record of the review process and the Architect/Engineer's "Action" marking.

Do not reproduce contract documents or copy standard printed information as the basis of shop drawings.

- C. Initial Submittal: Provide one correctable translucent reproducible print and one blue-line or black-line print; the reproducible print will be returned.
- D. Product Data: General information required specifically as product data includes manufacturer's standard printed recommendations for application and use, compliance with recognized standards of trade associates and testing agencies, and the application of their labels and seals (if any), special notation of dimensions which have been verified by way of field measurement, and special coordination requirements for interfacing the material, product or system with other work.

Refer to Division-23 and Division-26 sections for additional general requirements applicable to product data for mechanical and electrical work respectively.

E. Samples: Submit samples for the Architect/Engineer's visual review of general generic kind, color, pattern, and texture, and for a final check of the coordination of these characteristics with other related elements of the work. Samples are also submitted for quality control comparison of these characteristics between the final sample submittal and the actual work as it is delivered and installed.

Refer to individual work sections of these specifications for additional sample requirements, which may be intended for examination or testing of additional characteristics. Compliance with other required characteristics is the exclusive responsibility of the Contractor; such as, compliance is not considered in the Architect/Engineer's review and "Action" indication of sample submittals.

Documentation required specifically for sample submittals, includes a generic description of the sample, the sample source or the product name or manufacturer, compliance with governing regulations and recognized standards. In addition, indicate limitations in terms of availability, sizes, delivery time, and similar limiting characteristics.

Refer to individual sections of these specifications for samples, which, because of their relatively high cost or other special considerations, are intended to be returned to the Contractor for incorporation in the work. Such samples must be in an undamaged condition at the time of use. On the transmittal form to the Architect/Engineer, indicate such special requests regarding the disposition of sample submittals.

- F. Submittal: At the Contractor's option, and depending upon the nature of the anticipated response from the Architect/engineer, the initial submittal of samples may be either a preliminary submittal or a final submittal.
- G. Preliminary submittal, of a single set of samples, is required where requirements indicate the Architect/Engineer's selection of color, pattern, texture or similar characteristics from a manufacturer's range of standard choices is necessary.

Preliminary submittals will be reviewed and returned with the Architect/Engineer's "Action" marking.

H. Final Submittals: Submit 3 sets of samples in the final submittal, one set will be returned.

# 1.5 MISCELLANEIOUS SUBMITTALS:

- A. Inspection and Test Reports: Classify each inspection and test report as being either "shop drawings" or "product data" depending on whether the report is specially prepared for the project, or a standard publication of workmanship control testing at the point of production. Process inspection and test reports accordingly.
- B. Warranties: Refer to section "Products and Substitutions" for specific general requirements on warranties, product bonds, workmanship bonds and maintenance agreement. In addition to copies desired for the Contractor's use, furnish 2 executed copies of such warranties, bonds or agreements. Provide 2 additional copies where required for maintenance manuals.
- C. Project Photographs: The lead Contractor shall furnish 2 prints each of 3 project photographs at monthly intervals and at completion of project 2 prints each of 4 interior and 4 exterior photographs. Comply with Architect/Engineer's direction concerning desired vantage points for shots.
  - Photographs shall be 8" x 10" glossy color pints on single-weight commercial grade stock, with extra ¾" wide margin punched for standard 3-ring binder and a copy of negatives. Identify each print on the backside with name and address of photographer, name of project, date of shot and description of vantage point. Also provide final photographs on compact disks, digital video disks, USB thumb drives or SD cards using JPEG file format.
- D. Survey Data: Refer to Section 010000 "General Requirements" for specific general requirements on property surveys, field measurements, quantitative records of actual work, damage surveys and similar data required by the individual sections of these specifications. None of the specified copies will be returned.
- E. Survey Copies: Furnish 2 copies of general survey data. Provide 10 copies of the final property survey.
- F. Records of Actual Work: Furnish 4 copies of records of actual work, one of which will be returned for inclusion in the record documents as specified in Section 017000.
- G. Closeout Submittals: Refer to Section 017000 and to individual sections of these specifications for specific submittal requirements of project closeout information, materials, tools, and similar items.

#### 1.6 ARCHITECT/ENGINEER'S ACTION:

Action stamp: The Architect/Engineer will stamp each submittal to be returned with a uniform, self explanatory action stamp, approximately marked and executed to indicate whether the submittal returned is for a) unrestricted use, b) final-but-restricted use or c) must be revised and resubmitted; or d) without action (as explained on the transmittal form).

A. Final Unrestricted Release: Where the submittals are marked as follows, the work covered by the submittal may proceed provided it complies with the requirements of the contract documents; acceptance of the work will depend upon that compliance.

Marking: "NO EXCEPTIONS TAKEN"

B. Final-But-Restricted-Release: When the submittals are marked as follows, the work covered by the submittal may proceed provided it complies with both the Architect/Engineer's notations or corrections on the submittals and with the requirements of the contract documents; acceptance of the work will depend on that compliance.

Marking: "EXCEPTION TAKEN AS NOTED"

C. Returned for re-submittal: when the submittal is marked as follows, do <u>not</u> proceed with the work covered by the submittal, including purchasing, fabrication, delivery or other activity. Revise the submittal or prepare a new submittal in accordance with the Architect/Engineer's notations stating the reasons for returning the submittal; resubmit the submittal without delay. Repeat if necessary to obtain a different action marking. Do not permit submittals with the following marking to be used at the project site, or else where work is in progress.

Marking "REVISE AND RESUBMIT"

D. Other Action: Where the submittal is returned, marked with the Architect/Engineer's explanation, for special processing or other Contractor activity, or is primarily for information or record purposes, the submittal will be marked.

END OF SECTION.

#### **SECTION 01 40 00**

#### **QUALITY REQUIREMENTS**

#### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Tolerances
- C. References.
- D. Mock-up requirements.
- E. Testing and inspection services.
- F. Manufacturers' field services.
- G. Examination.
- H. Preparation.

## 1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

# 1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

#### 1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

# 1.5 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this section and identified in respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be comparison standard for remaining Work.
- D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Architect/Engineer.

# 1.6 TESTING AND INSPECTION SERVICES

- A. Employ and pay for services of an independent testing agency or laboratory acceptable to Owner to perform specified testing.
  - 1. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.
- B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Architect/Engineer and authority having jurisdiction.

- 1. Laboratory: Authorized to operate at Project location.
- 2. Laboratory Staff: Maintain full time registered Engineer specialist on staff to review services.
- 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Architect/Engineer or Owner.
- D. Reports will be submitted by independent firm to Architect/Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  - 1. Notify Architect/Engineer and independent firm 36 hours prior to expected time for operations requiring services.
  - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Architect/Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- H. Agency Responsibilities:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
  - 6. Perform additional tests required by Architect/Engineer.
  - 7. Attend preconstruction meetings and progress meetings.
- I. Agency Reports: After each test, promptly submit 3 copies of report to Architect/Engineer and to Contractor. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and specifications section.
  - 6. Location in Project.

- 7. Type of inspection or test.
- 8. Date of test.
- 9. Results of tests.
- 10. Conformance with Contract Documents.
- J. Limits On Testing Authority:
  - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency or laboratory may not approve or accept any portion of the Work.
  - 3. Agency or laboratory may not assume duties of Contractor.
  - 4. Agency or laboratory has no authority to stop the Work.

# 1.7 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations. Observer subject to approval of Architect/Engineer.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 00 Submittal Procedures, MANUFACTURERS' FIELD REPORTS article.

#### **PART 2 EXECUTION**

#### 2.1 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

# 2.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

#### **SECTION 01 60 00**

## PRODUCT REQUIREMENTS

#### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.
- F. Equipment electrical characteristics and components.

#### 1.2 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Furnish interchangeable components from same manufacturer for components being replaced.

#### 1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

# 1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

#### 1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one or manufacturers named and meeting specifications, substitutions are allowed in accordance with General Conditions Section 4.15 and Section 1.6 Product Substitution Procedures under Section 01 60 00.
- C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with General Conditions Section 4.15, the following article and filling out the "Substitution Certification" form.

#### 1.6 PRODUCT SUBSTITUTION PROCEDURES

- A. Architect/Engineer will consider requests for Substitutions only within 10 days after date of Owner-Contractor Agreement.
- B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents and fill out the "Substitution Certification" form and submit with all backup data.
- D. A request constitutes a representation that Bidder/Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
  - 2. Will provide same warranty for Substitution as for specified product.
  - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.

- 4. Waives claims for additional costs or time extension which may subsequently become apparent.
- 5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

### F. Substitution Submittal Procedure:

- 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution, along with "Substitution Certification" form.
- 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
- 3. Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

#### PART 2 PRODUCTS

# 2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.
- B. Cord and Plug: Furnish minimum 6-foot (2 m) cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

END OF SECTION

#### **SECTION 01 70 00**

## **EXECUTION AND CLOSEOUT REQUIREMENTS**

#### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Starting of systems.
- D. Demonstration and instructions.
- E. Testing, adjusting and balancing.
- F. Protecting installed construction.
- G. Project record documents.
- H. Operation and maintenance data.
- I. Manual for materials and finishes.
- J. Manual for equipment and systems.
- K. Spare parts and maintenance products.
- L. Product warranties and product bonds.
- M. Maintenance service.

# 1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.
- B. Provide submittals to Architect/Engineer required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- D. Owner will occupy all portions of building as specified in Section 01 10 00 Summary.
- E. See General Conditions and Supplementary General Conditions of the Contract for Construction for further information on 5% line item for Close Out Documentation, and Overhead, Profit and Bonding

# 1.3 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- D. Replace filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from site.

# 1.4 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer and Owner seven days prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Section 01 33 00 Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

#### 1.5 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion and final inspection.
- B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project.

- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within 4 months.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. Required instruction time for each item of equipment and system is specified in individual sections.

#### 1.6 TESTING, ADJUSTING AND BALANCING

A. Reports will be submitted by independent firm to Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents. General contractor is to cover costs for all testing and reports.

#### 1.7 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

#### 1.8 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.

- 5. Reviewed Shop Drawings, Product Data, and Samples.
- 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finish first floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension and detail.
  - 5. Details not on original Contract drawings.
- G. Submit three (3) electronic copies of all record drawings and approved shop drawings on thumb drives to Architect/Engineer.

# 1.9 OPERATION AND MAINTENANCE DATA

- A. Submit three (3) electronic copies of all operation and maintenance data on thumb drives to Architect/Engineer.
- B. Prepare cover with title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Subdivide content with permanent divider pages, logically organized as described below; with tab titling clearly identified.
- D. Drawings: Submit electronically with O&M documentation.
- E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.

- c. Parts list for each component.
- d. Operating instructions.
- e. Maintenance instructions for equipment and systems.
- f. Maintenance instructions for all finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
- 3. Part 3: Project documents and certificates, including the following:
  - a. Approved shop drawings and product data.
  - b. Air and water balance reports.
  - c. Certificates.
  - d. Originals and 2 Photocopies of warranties and bonds.

#### 1.10 MANUAL FOR MATERIALS AND FINISHES

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy be reviewed and returned with Architect/Engineer comments. Revise content of document sets as required prior to final submission.
- D. Submit three sets of revised final volumes in final form within 10 days after final inspection.
- E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.
- F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
- H. Additional Requirements: As specified in individual product specification sections.
- I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

# 1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.

- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.
- D. Submit three sets of revised final volumes in final form within 10 days after final inspection.
- E. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed, by label machine.
- G. Include color coded wiring diagrams as installed.
- H. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.
- I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- J. Include servicing and lubrication schedule, and list of lubricants required.
- K. Include manufacturer's printed operation and maintenance instructions.
- L. Include sequence of operation by controls manufacturer.
- M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- N. Include control diagrams by controls manufacturer as installed.
- O. Include Contractor's coordination drawings, with color coded piping diagrams as installed.
- P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- R. Include test and balancing reports as specified in Section 01 40 00 Quality Requirements.

- S. Additional Requirements: As specified in individual product specification sections.
- T. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

# 1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

# 1.13 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover
- F. Submit prior to final Application for Payment.
- G. Time Of Submittals:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
  - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

# 1.14 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections for two years minimum from date of Substantial Completion.
- B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.
- D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of Owner.

END OF SECTION

#### **SECTION 23 05 13**

# COMMON REQUIREMENTS FOR HVAC EQUIPMENT

#### PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 RELATED WORK

A. All Division 23 sections.

# 1.3 WORK SEQUENCE

- A. Install mechanical piping, duct, equipment and accessories as construction progresses so cutting and patching of new construction will not be required. See also paragraph "Sequencing and Scheduling" herein.
- B. The existing building will not be occupied during construction.

# 1.4 SUBMITTALS

- A. Provide submittals in accordance with Section 01330 Submittal Procedures.
- B. Submittal data containing manufacturer's data shall be sent to the Engineer and Owner for review.
- C. Electronic submittal data shall be assembled in Adobe Acrobat's Portable Data Format (PDF) for review.
- D. Electronic submittal data shall be assembled in one (1) <u>complete</u> PDF file and shall include an index sheet (TOC) listing each submittal item by specification number and its content. Each file shall also be organized with "Bookmarks" of each section. Submittals that do not have each submittal item referenced by "Bookmarks" shall be rejected.
- E. All electronic submittal data for a trade shall be submitted at <u>one time</u> except as noted herein.
- F. Data not submitted shall have a statement explaining why the data was not submitted.
- G. Submittals not conforming to any of the above requirements shall be rejected.

- H. The contractor shall go to each specification section to determine all technical information/data required and organize information/data using tabs for major headings as follows:
  - 1. Section 23 05 19 Meters and Gages for HVAC Piping
    - a. Pressure gauges.
    - b. Gauge Cocks.
    - c. Stem type thermometers.
    - d. Pete's (P & T) plugs.
    - e. Venturis/Metering Stations.
  - 2. Section 23 05 23 General-Duty Valves for HVAC Piping
    - a. Ball valves.
    - b. Butterfly valves.
    - c. Check valves.
    - d. Extended neck option for ball valves on insulated piping.
  - 3. Section 23 05 29 Hangers and Supports for HVAC Piping and Equipment
    - a. Upper attachments
    - b. Pipe attachment (hangers and clamps)
    - c. Lower pipe supports
    - d. Metal framing channel
    - e. Roof mounted equipment supports
      - 1) Roof curb adapters
    - f. Non-penetrating type equipment supports
      - 1) Condensate pipe on roof
  - 4. Section 23 05 53 Identification for HVAC Piping and Equipment
  - a. Pipe markers.
  - 5. Section 23 05 93 Testing, Adjusting, and Balancing for HVAC
    - a. TAB Agent NEBB or AABC Certificate (Do not submit samples of TAB forms)
  - 6. Section 23 07 16 HVAC Equipment Insulation
    - a. Insulation Product Information
    - b. Jackets and Accessories Product Information
    - c. Proof of Insulation Contractor's Three Years' Experience
    - d. System sheet for each system identifying material, thickness and finish for each system.
  - 7. Section 23 21 13 Hydronic Piping
    - a. Single sheet indicating piping system and application and the pipe material intended to be used. Do not submit data sheets on piping.
    - b. Automatic air vents
    - c. High capacity automatic air vents
    - d. Manual air vents
    - e. Diaphragm type expansion tank
    - f. Tangential type air separators
    - g. Strainers
    - h. Backflow preventers
    - i. Water Pressure Reducing Valves
    - j. Manual balancing valves
    - k. Pressure relief valves
    - 1. Flexible pipe connectors

- 8. Section 23 21 23 Hydronic Pumps
  - a. Vertical Close Coupled Inline Centrifugal Pumps
  - b. Automatic Condensate Pumps
  - c. Pump Specialty Fittings
    - 1) Triple Duty Valves
  - d. Motor data for pumps used with VFD's
  - e. Pump Manufacturer's Minimum GPM for pumps used in variable flow systems.
  - f. Variable frequency drives for self-sensing pumps and factory programming.
- 9. Section 23 23 00 Refrigerant Piping
  - a. Single sheet indicating piping system and application and the pipe material intended to be used. Do not submit data sheets on piping.
- 10. Section 23 25 00 HVAC Water Treatment
  - a. Bypass feeders (one shot feeder) for closed loop and chemicals.
- 11. Section 23 31 13 Metal Ducts
  - a. Medium pressure supply ducts and fittings
  - b. Ductwork liner
  - c. Note Concerning Duct Shop Drawings: The Contractor may generate ductwork shop drawings for their use in coordination with structural, sprinkler, electrical, plumbing, etc., but these are not required for submittal review and shall not be submitted to the Engineer for review.
- 12. Section 23 33 00 Air Duct Accessories
  - a. Fire dampers.
  - b. Low pressure flexible ducts.
  - c. Medium pressure flexible ducts.
  - d. Bellmouth take-off collars.
  - e. 45-degree take-off collars.
- 13. Section 23 36 00 Air Terminal Units
  - a. VAV terminal units
  - b. Fan powered boxes.
- 14. Section 23 37 13 Diffusers, Registers, And Grilles
  - a. Diffusers, Registers and Grilles
- 15. Section 23 41 00 Particulate Air Filtration and Bi-Polar Ionization Units
  - a. Medium Efficiency (MERV 6, 7 & 8) Filters
  - b. Bi-Polar Ionization Units
- 16. Section 23 51 00 Breechings, Chimneys, and Stacks
  - a. Special gas vent
- 17. Section 23 52 31 Condensing Boilers
  - a. Condensing Hot Water Boilers
- Section 23 81 20 Packaged DX VAV Rooftop Air-Conditioning Unitsa. Packaged DX VAV Rooftop Air Conditioning Units
- 19. Letter from Contractor stating submittals have been checked and comply with the Contract Documents
- 20. Certification that all items are furnished under this contract are free of hazardous materials (e.g. asbestos, PCBs)

- I. Manufacturer's data sheets shall be marked to clearly indicate the manufacturer, model number, size, color, accessories, required clearances, field connection details, weight loading, electrical characteristics, capacities, etc. being submitted. Submittals shall only include the products relevant to this specific project. Submittals shall not include other products produced by the manufacturer which are not specified on this project. Submittals containing several products on the same sheet shall have an arrow or other marker to identify the specific product submitted. Also, submittals for a single product that have options shall have an arrow or other marker to identify that the specified options are being provided. Submittals that include products not specified for this project, or that include several products on one sheet without being marked, or that do not show options selected shall be rejected. Variations from specifications shall be explained. Submittal preparer's name and telephone number shall be listed on the index sheet.
- J. Piping Submittals: Submittal data required for piping systems shall consist of a single sheet of paper with the type of piping systems on this project, and the corresponding piping the contractor intends to provide. For example: "Hot Water Piping Above Grade Schedule 40 black steel". Contractor shall not submit manufacture's data sheets on piping.
- K. Review, Corrections, or Comments made on the Submittals do not relieve the Contractor from compliance with the requirements of the Drawings, Specifications and Addendums (Contract Documents). By entering into this Contract, the Contractor agrees that the purpose of submittals is to demonstrate to the Engineer that the Contractor understands the design concept and that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and use. Review of shop drawing will be general only for basic conformance with the design concept. The review of such drawings, schedules or cuts shall not relieve the Contractor from the responsibility for correcting all errors of any sort contained in the submittals. The Contractor is responsible for confirming and correlating all quantities and dimensions; selecting proper fabrication processes, construction methods and installation techniques; coordinating this work with that of all other trades; and performing all work in a safe, workmanlike and satisfactory manner.
- L. Below are the submittal item codes that will be used when reviewing the submittal data. These codes show up on the ASubmittal Review" sheet. Only one copy of the submittal review sheet is returned upon completion of the review for each trade.
  - 1. RNE Reviewed, No Exceptions Noted
    - a. Indicates the information provided has been reviewed and no exceptions are taken. Contractor must still comply with the contract documents.
    - b. No corrective action required at this time.
  - 2. FNC Furnish with Noted Corrections
    - a. Indicates the contractor shall insure that all necessary or noted corrections are incorporated into equipment furnished to the project.
    - b. Contractor shall incorporate items requested in review comments, but re-submittal not required.

- 3. RES Revise and Resubmit
  - a. Indicates item is not presently acceptable as submitted but may be accepted provided additional information and/or changes are made.
  - b. Contractor shall revise and resubmit item to Engineer with additional information indicating compliance with Contract Documents prior to proceeding with work.
- 4. PSD Provide Submittal Data
  - a. Indicates submittal data was not provided for this item or section.
  - b. Contractor shall provide submittal data meeting the explicit requirements of the plans, specifications, and all addenda.
- M. Shop drawings and data submittals for materials requiring extra long delivery time shall be submitted for approval as soon as possible after execution of contract. All items shall be submitted for approval in a timely manner (prior to other submittals if necessary) so they may be properly incorporated in the building's structure. Allow a minimum of three weeks for review. No substitutions of materials or extensions of contract time will be allowed for Contractors failure to submit or order such materials sufficiently in advance of the work. See Division 1 for additional requirements for submittals.

# 1.5 REGULATORY REQUIREMENTS

- A. All work installed under Division 23 shall conform to the current adopted Edition of Building/Mechanical Codes and their appropriate amendments:
  - 1. Life Safety Code, NFPA 101
  - 2. International Building Code
  - 3. International Mechanical Code
  - 4. Standard for the Installation of Air Conditioning and Ventilating Systems, NFPA 90A
  - 5. Standard for Chimneys, fireplaces, vents and solid fuel burning appliances, NFPA 211
  - 6. International Gas Code
  - 7. Galloway Township/Atlantic County, New Jersey Codes
  - 8. Requirements of the State of New Jersey Fire Marshall's Office.
  - 9. ASHRAE 62.1 2004, Ventilation for Acceptable Indoor Air Quality.
  - 10. ASME Boiler and Pressure Vessel Code, Section 1, 4, and 9.
  - 11. Energy Code: ASHRAE 90.1.
- B. Obtain and pay for all permits, and request inspections from all authorities having jurisdiction, in a timely manner.
  - Contractor or subcontractor installing the gas piping shall contact the New
    Jersey Department of Labor, Safety Engineering Section and obtain a permit
    to install all gas fired equipment having a input of 200,000 BTUH: or
    greater. Contractor shall also make arrangements to have the equipment
    installation inspected by the New Jersey Department of Labor. A copy of
    the inspection shall be submitted and a copy shall be included in the
    operation and maintenance manuals.

- C. Materials and Equipment included in Underwriter's Label Service shall bear that label. Electrical equipment shall be UL approved as installed, and bear the UL label, unless noted otherwise herein. All fans shall be AMCA certified and bear that label for performance and sound. All air conditioning equipment shall be AHRI certified and bear that label.
- D. Where requirements of these specifications differ from specified codes and ordinances, conform to the more stringent requirements.

# 1.6 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions. Shift or relocate equipment or systems to avoid conflicts with other trades. Modifications to the work required to accommodate project conditions encountered in the field shall be made at no additional cost to the contract.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Engineer before proceeding.
- C. Install items so that there are no obstructions (e.g., pipes, conduits, etc.) blocking service panels of the equipment, or preventing the removal of the equipment.

# 1.7 SEQUENCING AND SCHEDULING

- A. Contractor shall coordinate work so as to avoid conflicts with other work in progress.
- B. Work shall progress in a manner that will not interfere with other trades. The Division 23 Contractor shall have coordination meetings with all other Contractors to ensure that all systems installed in "share areas" (e.g. ceiling plenums, mechanical rooms, etc.) are coordinated and installed to insure proper fit and access. All costs required for the coordination of the work between trades shall be borne solely by the Contractor.
- C. Install one VAV box and one fan powered box complete for review by the Engineer and Owner prior to the installation of remaining units.
- D. Contractor shall provide confirmation letters from the factory (not from the contractor) to the Owner that long lead items have been ordered. Long lead items are defined as items having longer than six-week fabrication schedules. See Division 1 Summary for additional requirements.

# 1.8 ACCEPTABLE PRODUCTS

A. Basis of Design: Model numbers indicated herein or shown on the drawings are the Basis of Design and are based on the most recent literature provided to the Engineer from the Manufacturer's Representative. The Contractor may substitute equal and approved equipment from the basis of design manufacturer or manufacturers listed in this specification (or set forth in an addendum) provided said equipment has all

features which are inherent with the "Basis of Design" equipment, meets all requirements of the plans and specifications, has like electrical characteristics (e.g., same voltage, phase, ampacity/fusing/circuit breaker requirements, single or multiple points of connection as indicated on the electrical drawings), and will properly fit in the available spaces in the building. If the Contractor chooses to provide equipment which meets all of the aforementioned requirements, but has different characteristics, from that shown on the Contract Electrical Drawings, he shall bear all costs associated with that substitution. Electrical costs include, but are not limited to materials (breakers, fuses, disconnects, wiring, conduits, panels, starters, contactors, and the like) installation costs and re-engineering. All electrical connections shall be coordinated with the Engineer and with the electrical subcontractor. Other costs may include, but are not limited to, additional structural support for heavier equipment than basis of design.

- B. Prior Approval: Substitutions of specified items and prior approvals of other manufacturers will not be considered.
- C. Acceptable Products: Where a manufacturer has been listed as being acceptable in the various specification sections (or addendums) hereinafter for a certain product, it shall be understood that the manufacturer has been approved as being capable of producing this product. This does not necessarily constitute approval of their standard product. The manufacturer's product shall still comply with all of the requirements and standards of this specification and not necessarily their standard specification, to the extent that it might require special custom manufacture to meet the requirements and standards of this specification, the requirements of the drawings and the inherent features of the "Basis of Design". Submitted products, not complying with the explicit requirement of these specifications and drawings and with the features of the "Basis of Design" will be rejected even if their manufacturer is listed in the specifications.

# 1.9 DRAWINGS

- A. General: Both the drawings and specifications shall be considered supplemental to one another so that materials and labor required by one but not the other shall be supplied and installed as though specifically called for by both. Where drawings and specification conflict, Contractor shall conform to the more stringent or costly of the two requirements.
- B. Scaling: The drawings are diagrammatic only and show generally the location of the equipment, ducts and pipes but are not to be scaled. All dimensions shall be verified at the building site. Prefabrication of work from the drawings shall be at the Contractor's risk.
- C. Existing Conditions: It shall be the Contractor's responsibility to visit the site prior to bidding the project and prior to beginning work to make himself familiar with existing conditions.

#### 1.10 SPACE CONDITIONS AND SERVICE CLEARANCE

- A. All equipment and materials shall fit into the available spaces in the building and must be introduced into the building so as not to cause damage to the structure. All equipment normally requiring service shall be made readily accessible by not locating it above (behind, etc.) piping, ductwork, conduit or other systems. Contractor shall also provide access by means of access panels, doors, etc. to be provided under this section of specifications where required or specified. Provide sufficient space to allow service (e.g. filter removal) of all equipment. Coordinate with all trades to insure accessibility and service of all equipment. Equipment located above lift out ceilings shall be considered to be accessible. Equipment located above hard (unremovable) ceilings shall be considered to be unaccessible and access panels shall be provided as specified herein.
- B. The contractor shall be responsible for verifying that the particular manufacturer's equipment that he chooses will fit in the available space and shall verify (prior to submitting equipment) that the service clearances that the manufacturer requires are available and shall not submit equipment that will not allow the manufacturer's service clearances. During construction, the contractor shall install the equipment such that the manufacturer's service clearances are provided by reading the installation instructions. The contractors shall bear all costs associated with providing equipment that requires service clearances different from the basis of design equipment. If the manufacturer's service clearances are not provided, the contractor shall remove the equipment and provide equipment with service clearances equal to the basis of design equipment. The contractor shall submit a detailed sketch and description of any modifications to install the particular manufacturer's equipment that he chooses, to demonstrate that the equipment will fit and have the manufacturer's service clearances. The sketch is not submitted for review or approval or for confirmation that it is correct, only to certify that the contractor has completely considered the installation of substitute equipment.

#### 1.11 MOISTURE INTEGRITY

- A. Roof: All roof penetrations shall be watertight and comply with the roof manufacturer's requirements and recommendations so as to be covered by the roof "Bond". All new roof penetrations shall be made inside roof curbs (conforming to the requirements of Division 23 Hangers and Supports for HVAC Piping and Equipment). Pitch pockets are not acceptable.
- B. Wall: All wall penetrations shall be sealed and caulked watertight.

# 1.12 NOISE AND VIBRATION

A. When in operation, all systems included in this section of specifications shall be free from objectionable or abnormal noise and vibration. See Division 23 - Hangers and Supports for HVAC Piping and Equipment of the specifications for specific vibration isolation requirements.

# 1.13 PROTECTION OF MATERIALS AND EQUIPMENT

- A. Delivery, Storage and Handling: Deliver products to site in factory-fabricated protective containers, with (where appropriate) factory-installed shipping skids and lifting lugs. Store in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
- B. Maintenance of Filters and Strainers: The Contractor shall be responsible for maintaining all air filters and liquid strainers until Final Certificate is issued. No air system shall be operated at any time without air filters and filters shall not be allowed to become overloaded with dust and dirt. For throwaway filters, new clean filters shall be installed. Strainer media shall be cleaned. See also paragraph "Air Handling Equipment Operation During Construction Period".
- C. During Construction: Pipe openings shall be closed with caps or plugs. All open duct shall be sealed tight with polyethylene. All equipment and material shall be stored in accordance with manufacturer's recommendations. No equipment, ductwork, piping, or materials shall be stored inside or outside the building unless it is properly protected from the weather. The Engineer reserves the right to reject any items furnished under Division 15 which have been damaged or are not in "likenew" condition. Existing facilities shall be protected. Any existing items damaged during construction shall be replaced or restored to their original condition by the Contractor, at no cost to the contract.
- D. Suspended Ductwork, Suspended Equipment and Suspended Piping: Contractor is also required to wrap suspended ductwork, equipment and piping on three sides with a minimum 4 mil thickness polyethylene taped to the bottom of the ductwork, equipment and piping. Polyethylene covering is required to protect from the weather, water, dirt, roof tar, etc.
- E. Non-Suspended Ductwork, Equipment and Piping: Contractor is required to wrap mechanical equipment, ductwork and piping that is not suspended with two layers of 4 mil polyethylene.
- F. Prior to Final Construction Review: All materials and equipment shall be cleaned. Chipped or scraped paint shall be retouched to match. All dents and sags in ductwork and equipment casings shall be straightened or replaced.
- G. Equipment Painting: Equipment which has been damaged beyond the point of retouching or has been retouched not to match the original finish shall be repainted in accordance with the Architectural painting section.

# 1.14 AIR HANDLING EQUIPMENT OPERATION DURING CONSTRUCTION PERIOD

- A. For the purpose of this paragraph, air handling equipment shall include, but is not limited to, air moving equipment such as rooftop air conditioning units, etc. Air handling equipment shall not be operated for space heating or cooling or air filtering during construction. Equipment shall be operated only to provide start up, check out, balancing, testing etc., in order to meet "Substantial Completion" goals and provide a complete working system to turn over to Owner. If air handling equipment must be operated during construction to maintain temperature conditions required by flooring, paint, or other building compartment products, mechanical contractor shall have written permission from General contractor and Owner prior to operating.
- B. Permanently installed air handling equipment used during construction shall not be operated during sanding, masonry cutting, or other operations generating airborne particulate. Where air handling equipment is utilized during construction, units shall be provided with filtration media with a minimum efficiency reporting value (MERV) of 8 at each return grille/duct as determined by ASHRAE 52.2-1999. Air filtration shall be replaced as specified prior to Occupancy. If air handling cooling/heating coils are found to be overloaded with dirt/dust it shall be the mechanical contractor's responsibility to clean coils to insure maximum performance. If equipment must be operated during these activities mechanical contractor shall have written permission from General contractor and Owner prior to operating.

# 1.15 ELECTRICAL

- A. General: Motors, controls, relays and switches required for proper operation of equipment covered under this section shall be furnished and installed under this division of the specifications. Control work is provided under a separate contract between the Owner and the Owner's control company, Siemens.
- B. Wiring: Power wiring through the disconnect and starter and to the motor shall be furnished and installed under Electrical Section. Control and interlock wiring is provided under a separate contract. All control wiring and conduit shall conform to the material and installation requirements of Division 26.
- C. Electrical Connections: Voltage, phase, ampacity and connection arrangement (e.g. single or multiple point) of each item of electrically driven equipment provided under this section of specifications shall conform to that shown on the Electrical drawings.
- D. Electrical Characteristics: The horsepowers, voltages and phases shown on the drawings and specified herein, are the estimated power requirements of all equipment furnished herein and is the basis of the design shown on the electrical drawings. If the Contractor provides equipment from the "Basis of Design" manufacturer or from other approved manufacturers with larger horsepowers, different voltages, different phases or ampacity, he shall coordinate with other trades to provide any additional wiring, circuitry, starters, breakers, transformers, etc., as required at no additional cost to the Contract.

# 1.16 MOTORS

- A. General: This paragraph is applicable to all Division 23 specification sections. Motors less than 250 watts and used for intermittent service may be manufacturer's standard.
- B. Motor Enclosures: Motor enclosure shall be appropriate for the environment that the motor will be in. In the absence of specifically identified motor enclosure style, the following requirements shall apply. Motors located in exterior locations, wet air streams, etc. shall be totally enclosed fan cooled (TEFC). Motors located in interior locations, in mechanical rooms, in dry air streams, etc. shall be open drip proof (ODP).
- C. Motors Efficiency: Each motor 1 hp and above shall have a guaranteed minimum efficiency complying with the Energy Independence and Security Act of 2007 (EISA), and as specified below, and a minimum power factor of 82.5. Multi-speed motors do not have to comply with these efficiencies. Each motor's NEMA nominal efficiency shall be shown on the motor nameplate. Efficiency and losses shall be determined in accordance with the latest revision of IEEE Standard 112, Method B, using "Accuracy improvement by segregated loss determination including stray load loss measurement." Motors shall meet the minimum NEMA premium motor efficiency, as outline in MG1 Table 12-12, which is higher than the EPACT efficiency. Each submittal shall show that motor meets this guaranteed minimum efficiency, and that efficiency was measured according to this specification. Minimum efficiencies for 4-pole 1750 rpm motors are listed below:
  - 1. Motor HP 1: Minimum Premium Efficiency: 85.5
  - 2. Motor HP 1.5 to 2: Minimum Premium Efficiency: 86.5
  - 3. Motor HP 3 to 5: Minimum Premium Efficiency: 89.5
  - 4. Motor HP 7.5:
    - a. Minimum Premium Efficiency (ODP): 91.0
    - b. Minimum Premium Efficiency (TE): 91.7
  - 5. Motor HP 10: Premium Efficiency: 91.7
- D. Motor Service Factor: Motor service factor for all equipment 1/8 hp and above shall be 1.15 for ODP motors and 1.0 for totally enclosed motors.
- E. Motor Speed: Maximum 1800 rpm. Single phase, ODP motors shall be equipped with speed controllers as specified on plans.
- F. Motor Thermal Overload Protection: All single-phase motors shall be provided with integral overload protection. Internal protection shall automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.
- G. Bearings (Single Phase Motors): Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, pre-lubricated-sleeve type for other single-phase motors.
- H. Bearings (Three Phase Motors): Double-shielded, pre-lubricated ball bearings suitable for radial and thrust loading.

- I. Motor Nameplate: Provide on all motors 1/4 hp and above a permanent visible engraved nameplate indicating horsepower, RPM, voltage, phase, amps, cycles, full load amps, locked rotor amps, frame size, service factor, power factor and efficiency.
- J. Motor Type: All single-phase motors shall be provided with motor type suitable for starting and operating torque. Shaded pole motors shall be allowed on 1/20 hp or less motors only. Split-phase, capacitor start, permanent split capacitor and capacitor start/capacitor run shall be provided on all single-phase motors above 1/20 hp based on specific torque requirements.
- K. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
- L. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor. Whenever starting requirements exceed operating requirements, the motor shall be large enough to start the equipment without overheating. As a minimum, motors shall be sized at 120% of design BHP requirements. Each motor shall be sized to drive the equipment taking into account belt losses.
- M. Motors controlled by Variable Frequency Drives: All motors that are controlled by a variable frequency drive shall be either premium efficiency type or inverter duty rated. Motor windings shall be insulated with Class F insulation or Class H insulation. General high efficiency motors and motors with Class B insulation shall not be allowed. Motor manufacturer shall certify in writing with motor submittal that motor is compatible with variable frequency drive usage.

# 1.17 PAINTING

A. All bare steel piping, pipe hangers, supports and miscellaneous metal exposed to view provided under this section of specifications, shall be cleaned and painted under the Architectural painting section of the specifications. Supports, hangers and accessories exposed to view shall not be electroplated, in order to allow them to be painted. Painting shall be done under this division of the specifications in accordance with the requirement of ANSI A13.1.81.

# 1.18 CLEANING

- A. The Contractor shall maintain the site reasonably clean and free of excessive debris and leftover materials at all times. All trash and debris shall be hauled from the job site on a daily basis for disposal. Prior to testing and adjusting, equipment shall be clean and free of any construction debris and litter.
- B. Contractor shall meet all contractual requirements as related to site cleanliness including dust control.

# 1.19 HAZARDOUS MATERIAL ALERT FOR NEW MATERIALS

A. Contract Materials which are scheduled to be incorporated into the work under this Contract shall first either be certified by the Manufacturer to be free of hazardous materials or be inspected and tested by accredited laboratories and certified to be free of hazardous material content (e.g. Asbestos, PCBs, lead, etc.) in accordance with OSHA, EPA and AHERA Rules (and 1982 School Rules).

# 1.20 ACCESS PANELS

- A. Some mechanical systems may be made inaccessible by the installation of "hard" ceilings or by walls above the ceiling. See the finish schedule and the floor plans for the location of all "hard" ceilings and walls which extend above the ceiling. Provide access panels in these ceilings or walls (and any other locations where mechanical items are made inaccessible by ceilings or walls) for access to mechanical equipment and items requiring access above these ceilings.
- B. For all access panels in masonry, construction shall be as follows: Panels shall be sized as required for proper access and removal of the equipment but as a minimum shall be 18" x 18". Access panels shall have concealed continuous hinge, flush (not recessed) door, 14-gauge galvanized steel frame with prime coated finish, with pre-drilled anchor holes in corners, 1/4 turn flush mounted screwdriver operated latch(es) (on maximum 8" centers) and 14-gauge steel door with prime coated finish and rounded corners. Entire panel shall be painted to match ceiling or wall. Provide fire-rated access panel where required. Access panels shall be manufactured by Venco Products, Inc., Elmdor or Cesco.

# 1.21 GENERAL DEMOLITION

- A. General: Demolition shall include the wrecking and removal of certain mechanical components. See drawings for extent of demolition.
- B. Disposal: Equipment retained shall become property of the Contractor and shall be lawfully removed from site. With regards to the salvage value of property that is to be demolished, Owner shall not be responsible for condition of or loss of, or damage to such property after award of contract. Some specific equipment has been identified to be retained by the Owner as indicated on the drawings.
- C. Existing work to remain shall be protected by temporary covers, supports, etc. during demolition work. Should any item that is to remain be damaged during demolition work, it shall be repaired to its original condition or replaced with new.
- D. Some existing equipment and ductwork is shown to remain for reuse. The contractor is not responsible for the condition of or proper operation of any existing equipment or ductwork that is being reused. (See above paragraph for exception when contractor damages item that is to remain.) For example, if air conditioning unit is being reused, and unit does not operate properly, contractor is not responsible for unit operation.

E. Provide weather protection for all interior portions of the building during demolition work. Where existing wall mounted or roof top or other equipment is being removed and expose the building to the elements, have materials and workmen ready to install adequate temporary covering of the exposed area.

#### 1.22 ASBESTOS ALERT FOR EXISTING CONSTRUCTION

- A. General: The Contractor shall use caution during all demolition procedures. It shall be the Contractor's responsibility to see that all his personnel and that all of his subcontractors personnel are made aware during demolition, or any similar work, or in the process of connecting to or working adjacent to existing equipment or materials, that at any time any workman encounters any suspect asbestos containing materials (ACMs), all work in that area shall be stopped immediately and the suspect spaces kept cleared until a testing and/or abatement by a properly qualified firm, selected by the Owner, has been accomplished. In the event the suspect material proves to be asbestos, all affected areas shall be kept isolated until all such asbestos material has been removed and the spaces affected duly approved for normal use. It is to be noted that only Owner authorized and approved personnel shall be allowed to participate in any manner whatsoever either in the search of or the removal of asbestos suspect material. See also the notes on the drawings.
- B. Asbestos Containing Materials to Remain: The Owner may elect <u>not</u> to remove ACMs which are <u>not</u> anticipated to conflict with new work or demolition required in this contract and will, therefore, remain undisturbed. If during demolition or new work procedures the Contractor determines that he must disturb any suspect ACM (that the Owner intended to leave undisturbed), he shall stop work until the Owner's Abatement Firm can properly remove the Asbestos.

# 1.23 STRUCTURAL COORDINATION

A. The party responsible for the installation of the system furnished under Division 23 shall provide the General Contractor with the weight of all mechanical equipment and ductwork and piping and the exact location. General Contractor shall then insure all structural members are properly sized and all mechanical penetrations are properly framed to support the full perimeter of the equipment. See also paragraph "Acceptable Products".

#### 1.24 ROOM NUMBERS

A. The room numbers indicated on the Contract Documents were provided by the Engineer to assist in identifying spaces during construction. These room numbers may not necessarily be the Owner's final choice of room numbers. The contractor shall obtain from the Owner the final choice of room numbers and shall use these numbers wherever required. (For example, room numbers are used in programming of control systems, and shall match the Owner's final choice.)

# 1.25 CONTRACTOR REQUESTS FOR ELECTRONIC COPIES OF CAD DRAWINGS

- A. If the Contractor requests to obtain electronic copies (emailed files or disc files) of CAD drawings from Andrews, Hammock & Powell, Inc., (AH&P) this paragraph shall describe the conditions for this action to take place.
  - 1. The Contractor must obtain written permission from the Architectural client, that the Architect does not object to providing electronic copies when AH&P is hired by an Architect to perform Engineering services.
  - 2. If AH&P is prime party (i.e. not hired by an Architect, but hired by the client directly), Contractor must obtain permission of AH&P to obtain electronic copies.
  - 3. If approval by Architect or Engineer (as noted above) is obtained, Contractor may obtain electronic copies based on the following rates: \$25 per sheet, with minimum \$200 per project.
  - 4. Contractor shall mail a copy of the check to AH&P, payable to AH&P and shall sign the enclosed indemnification letter, and send this letter to AH&P, along with requested sheets. If time is of essence, a copy of the check and indemnification may be faxed as evidence of the Contractor's intent to mail said documents.
  - 5. Upon receiving the check or faxed copy, and signed indemnification letter, electronic copies of requested sheets shall be provided. AH&P reserves the right to alter the electronic copies by removing Professional Engineering Stamp, title block information, company logo, and similar information that is not relevant to the Contractor's needs. Contractor shall indicate the desired format for CAD drawings (DWG or DGN).

**END OF SECTION** 

	ews, Hammock and Powell, Inc. Charter Lane
Maco	n, GA 31210
Re:	Letter of Indemnification
	(Project Name)
Gentl	emen:
suppl harm consu to att misin data p limita	reby executing this Letter of Indemnification on behalf of itself and its subcontractors and iers,
natur	(company name) also by least the drawings prepared by Andrews, Hammock and Powell, Inc. is schematic in e and is not intended as a shop drawing, dimensional drawing or fabrication drawing. Any national information extracted from the CAD data by
	(company name) is done purely at their own
	(company name) agrees to ensure any use of the above referenced CAD information without the expressed written authorization by other projects other than referenced project is hereby prohibited.
Signir	ng on behalf of(company name),
Signa	ture
Print	Name
 Date	

#### **SECTION 23 05 14**

# CLOSEOUT DOCUMENT REQUIREMENTS FOR HVAC

#### 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 SECTION INCLUDES

- A. Mechanical Closeout Document Requirements which are specifically applicable to all Division 23 Sections, in addition to the requirements of Division 1 General Requirements.
- B. HVAC Closeout document requirements.
- C. Record Document Submittals "As-Builts".
- D. Contractor Guarantee.
- E. Manufacturer Warranties.
- F. Operating Instructions and Training.
- G. Operation and Maintenance (O&M) Manuals.
- H. O&M Instruction Form.
- I. Completion of Work.
- J. Service Contracts.
- K. Manufacturer's Field Services and Factory Start-up

# 1.3 RELATED WORK

A. All Division 23 sections.

# 1.4 RECORD DOCUMENT SUBMITTALS "AS-BUILTS"

A. The contractor shall be required to maintain a clean, undamaged set of blue or black line white prints of contract drawings and shop drawings.

- B. The HVAC contractor shall mark the set to show the actual installation where the installation varies substantially from the work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
  - 1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the work.
  - 2. Mark new information that is important but was not shown on Contract Drawings or Shop Drawings.
  - 3. Note related Change Order numbers where applicable.
  - 4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
  - 5. "As-builts" shall be submitted to the engineer for review of the mechanical as installed upon completion of the work. Changes on "as-builts" are to be shown using standard engineering drafting practices. Freehand drawn changes will not be accepted.

# 1.5 CONTRACTOR GUARANTEE

A. All equipment and materials furnished (and/or installed under this section) and all work performed under this section of specifications, shall be guaranteed to be free of defective materials and workmanship for a period of one year (unless a longer period is specified elsewhere) after date of substantial completion. Upon notice of failure of any part of the guaranteed equipment during the guarantee period, the affected part or parts shall be promptly replaced with new parts by the Contractor at no additional cost to the Owner. All labor required to perform guarantee shall be included as part of the complete guarantee warranty.

# 1.6 MANUFACTURER'S WARRANTIES

- A. Provide as a minimum a one (1) year manufacturer's equipment warranty against defective components for each piece of equipment and its components installed under their respective specification section prior to final inspection in accordance with each of the trades listed below. Equipment warranties shall commence on the date of Substantial Completion as established in the Certificate of Substantial Completion issued by the Engineer. Any parts which fail during the first year shall be replaced by the Contractor at no additional cost to the Owner.
- B. Each piece of equipment and its components furnished shall carry a minimum one (1) year warranty for replacement of parts and the labor required to complete such warranty work. Equipment and parts requiring warranties longer than one (1) year will be listed below.
  - 1. All HVAC equipment containing compressors shall have a five (5) year manufacturer's parts only warranty on the compressor.
  - 2. Pressure Compensating Flow Control Valves: 5-year parts only
  - 3. Packaged Condensing Hot Water Boilers: 10-year parts only on the entire heat exchanger.

- 4. Rooftop Air Conditioner: 5-year manufacturers parts only warranty on refrigeration compressors, 10-year non-prorated materials only on gas fired heat exchangers. A 5 year limited warranty for "0% 100%" economizers.
- 5. Self-Sensing Pumps: Entire pump package shall carry 18-month parts warranty. Variable frequency drive shall carry 18-month parts and labor warranty. Motor shall carry 12-month parts and labor warranty.

# 1.7 OPERATING INSTRUCTIONS AND TRAINING

- A. Instructions: Instruct operating personnel as required (but a minimum of 16 hours) in operation and maintenance of all systems included in this Division (23) of the specifications. In addition, there shall be the quantity of dedicated instruction for certain specific pieces of equipment as specified in the individual specification sections herein. Provide signed O & M Instruction Verification Form as specified in later paragraph certifying instructions have been received.
- B. Training: See each specification section for specific training requirements.

# 1.8 OPERATING AND MAINTENANCE (O&M) MANUALS

- A. Operating and maintenance manuals shall comply with Division 1 Operation and Maintenance Data.
- B. Three bound and indexed Operating and Maintenance Manuals and two (2) electronic PDF format copies (emailed) shall be prepared by the Contractor and be submitted for approval prior to delivery to operating personnel. Binders shall be 3-ring commercial grade, complete with inside storage pockets, sheet protectors, spine and front cover labels.
- C. Each Manual shall contain the following information, data and drawings. The exact format and order of the following information shall comply with Division 1 requirements. If no Division 1 requirement exist, format and order shall be as listed below.
  - 1. List of Contents with tabs. Insert under clear front cover of binder.
  - 2. Contractors one (1) year guarantee.
  - 3. Manufacturer's equipment warranties (provide a warranty for each piece of equipment).
  - 4. Copy of O & M Instruction Form showing Contractor has instructed designated personnel in the proper operation of all Division 21 systems.
  - 5. Installation, operating and maintenance instructions for each item of equipment. Provide trouble shooting checklist guide.
  - 6. Manufacturer's list of renewal parts for each item of equipment with recommended stock items and quantities indicated.
  - 7. Copy of approved submittals, shop drawings showing layouts and construction details.

#### 1.9 COMPLETION OF WORK

- A. At the completion, an on-site construction review shall be made and the entire system shall be shown to be in specified working condition. The following shall be available during the inspection:
  - 1. Contractor representative
  - 2. Test and Balance Report
  - 3. Complete specifications and drawings with all addenda and revisions.

# 1.10 EXTENDED SERVICE CONTRACTS

A. Refer to each specification section to determine if an extended (beyond 1 year) service contract is to be provided for the piece of equipment listed in the specifications.

#### 1.11 MANUFACTURER'S FIELD SERVICES AND FACTORY START-UP

- A. Refer to each specification section for additional requirements the manufacturer shall provide under the provisions of this specification.
- B. Upon completion of the equipment installation the Contractor shall obtain the services of the manufacturer's direct representative at no additional cost to the owner to perform a start-up of the piece of installed equipment. The factory authorized and trained representative shall submit a certificate or letter stating the equipment has been successfully started, adjusted and tested in accordance with the manufacturer's recommendations. Contractor shall refer to each specification section to determine which equipment/systems require start-up by factory authorized personnel. Some representative equipment/systems which require start-up are listed below.
  - 1. Condensing Boilers
  - 2. DX VAV Rooftop Air Conditioning Units
  - 3. Self-Sensing Pumps

# 1.12 MECHANICAL CONTRACTOR'S START-UP CARDS AND CHECK LISTS

- A. Ceiling Cassettes Fan Coil Unit Check List:
  - 1. Provide a check list to verify each piece of mechanical equipment has been installed correctly and has been started up properly. Also, verify all filters are cleaned. The check-off form shall be as follows:
  - 2. The checklist shall include the
    - a. Project Name.
    - b. Company Name.
    - c. Contractor's Name and Title
    - d. Contractor's Telephone Number
    - e. Date check list was performed
    - f. Signature of personnel performing check list.
  - 3. The checklist shall also include the following for **each** fan coil unit:
    - a. Equipment Tag
    - b. Verify access panel and filter is accessible (if applicable).

- c. Verify terminal units have minimum length of medium pressure duct at the inlet of the terminal units.
- d. Verify filters are cleaned.
- 4. Include all items listed in the manufacturer's installation and start up procedures.

# 1.13 O & M INSTRUCTION FORM

- A. Contractor shall provide instruction to operating personnel for the minimum hours specified in each specification section.
- B. Contractor shall coordinate a schedule of startup/operation and maintenance instruction meetings between the Owner's representatives, various subcontractors and manufacturer's representatives. Submit the following completed form. Some representative systems and equipment are included in the form below, but contractor shall customize the form based on the specific systems and equipment on this project.

# OPERATIONAL INSTRUCTION VERIFICATION FORM

Operation and maintenance procedures for major systems and equipment were thoroughly explained to the Representatives as follows:

<b>Equipment Item</b>	Date Instruction Received	Owner's Representative Name (printed)	Owner Representative Initial or Signature	
Pumps				
Boilers & Accessories				
DX VAV Rooftop Air Conditioning Units				
VAV Boxes and Fan Powered Boxes				
Building Automation System Controls				
"I certify that the operation and maintenance procedures of all the major mechanical systems have been thoroughly explained to the Owner's Representative."				
Company:				
Name:				
Title:				
Signature:				
Date:				

**END OF SECTION** 

#### **SECTION 23 05 19**

# METERS AND GAGES FOR HVAC PIPING

#### PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following meters and gauges for mechanical systems:
  - 1. Pressure gauges.
  - 2. Pressure snubbers.
  - 3. Gauge Cocks.
  - 4. Stem type thermometers.
  - 5. Separable socket wells.
  - 6. Pete's (P & T) plugs.
  - 7. Steel venturis.

# 1.3 SUBMITTALS

- A. Product data shall be submitted under provisions of Division 23 Common Requirements for HVAC Equipment. For each type of product herein, include performance curves.
- B. Shop Drawings: Schedule for thermometers and gauges indicating manufacturer's number, scale range, and location for each. Identify the specific ranges for the equipment used on this project for thermometers and gauges. Submittals showing thermometers and gauges with multiple sizes, ranges, materials, etc., without showing specific sizes, ranges, materials, etc., for this project will be rejected.
- C. Operation and maintenance data shall be submitted under provisions of Division 23 Closeout Document Requirements for HVAC.

# PART 2 - PRODUCTS

# 2.1 DIAL TYPE PRESSURE GAUGES

A. General: Case constructed of brass or cast aluminum or stainless steel, back flange for surface mounting, flangeless for remote mounting, rattle-proof glass or acrylic window held in place with an "0" ring and screwed ring, black scale graduations on a white background and adjustable pointer. Socket and tip to be stainless steel or brass, threaded 1/4" NPT. Bourdon tube to be phosphor bronze or stainless steel with brass movement. Gauge to be 4-1/2" diameter. Provide pressure snubber and gauge cock for each pressure gauge. Units for all gauges shall be in English (PSI).

# B. Ranges:

- 1. Pumps: Where a specific range is not listed below, range selected so that suction pressure is above lower 20% and discharge pressure is below upper 20% of scale. Both suction and discharge scale ranges shall match.
  - a. Hot Water Pumps: 0 to 50 psi.
- 2. Bladder Expansion Tank: Range shall be 0 to 60 psig.
- 3. Pressure Reducing Valves on Domestic Water and at Make-up Water Station: Upstream of pressure reducing valve range shall be 0 to 150 psig. Downstream of pressure reducing valve range shall be 0 to 50 psig.
- C. Manufacturers: Dial type pressure gauges shall be manufactured by Ashcroft, Trerice, Weksler, FNW, Weiss, Palmer or Moeller.

# 2.2 PRESSURE SNUBBER

A. Brass or stainless steel with threaded 1/4" NPT connection designed to prevent shock to gauge with porous corrosion resistant metal pressure filler. Provide porous disc for steam or water service as appropriate. Trerice Model No. 872-1 or 872-4 (air and gases) or Model No. 872-2 or 872-5 (water and steam), Weis Model PSN, FNW Model PSB, Ashcroft Model 25, or equal by Palmer or Weksler Model BW-42 or SW-42.

# 2.3 GAUGE COCKS

- A. 200 SWP. 400 WOG, threaded ends, threaded bonnet, bronze body, needle point bronze stem and bronze seat, hand wheel handle, gland packed. Size shall be 1/4".
  - 1. Nibco: T-256-AP
  - 2. Hammond: IB-415
  - 3. Crane: 88
  - 4. Milwaukee: 600
  - 5. Stockham: B-64
  - 6. Treice: 735-2 (Brass)
  - 7. Weksler: AV-34
  - 8. Weiss: 25NVBR
  - 9. FNW: NVB

#### 2.4 STEM TYPE THERMOMETERS

- A. General: Adjustable angle industrial type constructed of brass or cast aluminum (or Valox polyester) case, rattle-proof glass window, black scale graduations and red reading mercury tube. Stem to be constructed of brass or stainless steel, with 3/4" thread for use with separable socket well. Scale to be 7" long with 3-1/2" long stem.
- B. Ranges:
  - 1. Heating Hot Water: 30° to 240°F in 2° divisions.
- C. Manufacturers: Stem type thermometers shall be manufactured by Ashcroft, Trerice, Weksler, FNW, Weiss, Palmer or Moeller.

# 2.5 SEPARABLE SOCKET WELLS

A. Provide for all thermometers and control bulbs mounted in piping. Wells shall be constructed of brass or stainless steel, be furnished complete with screwed cap and shall have lagging extension. Wells shall be suitable for 3-1/2" stems. Where wells are installed in straight runs of pipe smaller than 2-1/2", increase pipe size to 2-1/2" for minimum 4" either side of well. Wells shall be installed at 45 degrees or greater above horizontal and be filled with SAE 10 W oil.

# 2.6 PRESSURE - TEMPERATURE PLUGS

A. Pressure temperature plugs shall be solid brass having a double Nordel seat suitable for temperatures of 275°F and 500 PSI., each plug shall have a color-coded cap retainer for easy identification, (Yellow for Nordel, Blue for Neoprene). Provide extended neck type on insulated piping. Plugs shall be #110 (1/4") or #710(2") "Pete's Plug II" as manufactured by Peterson Equipment Co, Superseal Model by Flow Design or equal by Nexus, FNW, Palmer or Weksler.

#### 2.7 STEEL VENTURIS

A. Carbon steel venturi with high signal/low loss design with ASTM A-120 body, rated at 400 psig at 250°F, with three port averaging throat signal, flanged or Schedule 40 welded ends, with two 1/4" Schrader type brass access ports with caps. Accuracy shall be +3% of full scale. Venturi shall be installed with manufacturer's required pipe diameters upstream and downstream, but as a minimum shall have five pipe diameters upstream of venturi. Venturis shall be manufactured by Flow Design, Inc., Pro Hydronics, Barco, Preso, Hydronic Components, Inc. (HCI), Griswold or Garand.

# PART 3 - EXECUTION

# 3.1 INSTALLATIONS

- A. Install direct-mounting thermometers and adjust vertical and tilted positions.
- B. Install direct-mounting pressure gauges in piping tees with pressure gauge located on pipe at most readable position.
- C. Install gauge cock and pressure snubber fitting in piping for each pressure gauge.
- D. Install pressure temperature plugs in tees in piping, or in weldolets or threadolets.
- E. Install flow indicators, in accessible positions for easy viewing, in piping systems.
- F. All gauges, flow meters, venturis, etc. shall be installed in accessible locations in accordance with manufactures instructions.

# 3.2 CONNECTIONS

A. Install meters and gauges adjacent to machines and equipment to allow service and maintenance for meters, gauges, machines, and equipment.

#### ADJUSTING 3.3

Adjust faces of meters and gauges to proper angle for best visibility. A.

END OF SECTION

#### **SECTION 23 05 23**

# GENERAL-DUTY VALVES FOR HVAC PIPING

#### PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

# 1.2 SUMMARY

- A. This Section includes the following general-duty valves:
  - 1. Ball valves.
  - 2. Butterfly valves.
  - 3. Check valves.

# 1.3 SUBMITTALS

A. Product data for each type of valve indicated shall be submitted under provisions of Division 23 Section "Common Requirements for HVAC Equipment."

# 1.4 QUALITY ASSURANCE

- A. ASME Compliance: ASME B31.9 for building services piping valves.
- B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

# 1.5 STORAGE

- A. Use the following precautions during storage:
  - 1. Maintain valve end protection.
  - 2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

# PART 2 - PRODUCTS

# 2.1 SHUT OFF VALVES

- A. Shut off valves for the hot water systems shall be:
  - 1. Ball Valves: 2" and smaller; 400 psi WOG; standard port, 2-pc. bronze construction, blow-out proof stem, solder or threaded ends as applicable. Provide chrome plated forged brass ball. Provide teflon (TFE) packing and packing nut to allow stem leakage correction. "O" ring seals are not

allowed. Valve shall conform with MSS-SP110. Provide a stem extension on insulated piping. Length of extension shall be a minimum of 2-1/4". If stem extension is not factory installed, contractor shall field install stem extension.

a. FNW: 421

b. Milwaukee: BA250/BA200
 c. Hammond: 8211/8201
 d. Stockham: S-255/T-255

e. Flow Design: HB

f. Watts: B-6001/B-6000

g. Kitz: 69/68

h. Apollo: 70-200-01, 70-100-01i. American Valves: G100

j. Nibco: S-FP-600

2. Butterfly Valves: 2-1/2" to 12": 200 psi cwp (cold working pressure), 200 WOG, 230°F maximum temperature, lug or grooved style, ductile iron body, extended neck, EPDM liner, stainless steel one-piece stem, bronze or aluminum or electroless nickel coated ductile iron disc, lever lock, adjustable memory stop. All butterfly valves shall have bubble-tight shutoff at full pressure rating and be suitable for bidirectional dead end service at 200 psi without the need for a downstream flange. Butterfly valves shall conform with MSS-SP67. Provide lever lock with adjustable memory stop for valves 5" and smaller.

a. Nibco: LD-2000b. Crane: 14-N-TL

c. Stockham: LD-752-B53-E

d. Hammond: 6211e. Centerline: Series A

f. Victaulic: 300

g. Watts: BF03-121-15h. Mueller: 56ANK6-1

i. Apollo: LD141

j. Kitz: 6122Ek. SSI: 125LDl. FNW: 732E

m. Milwaukee: ML-232E

# 2.2 CHECK VALVES

- A. Check Valves 2" to 12": 200 psi WOG; horizontal swing 2" and smaller; regrinding type, renewable discs, Y-pattern, solder ends. 2-1/2" and larger; bolted bonnet, renewable seat and discs, or aluminum bronze or EPDM coated ductile iron disc with PPS coated or welded on nickel seat, flanged ends.
  - 1. 2" and Smaller:

a. Apollo: 161S or 161T

b. Nibco: S-413 or T-413

c. Crane: 34

d. Hammond: IB 912

e. Stockham: B-319Y and B-309Y

f. Victaulic: -- g. Anvil: --

h. Kitz: 23

i. Milwaukee: 509 and 1509

j. FNW: 1241

# **PART 3 - EXECUTION**

#### 3.1 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install triple duty valves and check valves 5 pipe diameters minimum downstream from pump discharge or elbows to avoid flow turbulence. For horizontal applications, valves shall be installed with disc hinge pin in vertical position. Provide minimum companion flange bore to allow proper operation of disc.
- F. Where flanged connections are provided to connect butterfly valves to other flanged piping components, the contractor shall provide spool pieces as necessary to allow the disc to extend to the fully open position.
- G. Install valves with stems upright or horizontal, not inverted.
- H. Use ball valves (or butterfly valves, as specified) for shutoff and to isolate equipment, to isolate systems and vertical risers.

# 3.2 JOINT CONSTRUCTION

- A. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

# 3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

# END OF SECTION

#### **SECTION 23 05 29**

# HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

#### PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following hangers, supports and accessories for mechanical system piping and equipment:
  - 1. Coatings
  - 2. Upper attachments
  - 3. Pipe attachment (hangers and clamps)
  - 4. Metal Framing Channel
  - 5. Hanger Rods
  - 6. Insulation Shields
  - 7. Concrete Equipment Bases
  - 8. Sleeves
  - 9. Roof Mounted Equipment Supports
  - 10. Vibration Isolators

# 1.3 PERFORMANCE REQUIREMENTS

A. All supports utilized under Division 23 shall meet the sizing criteria specified herein. No support shall be loaded to more than 20% of its yield strength (thereby providing a safety factor of 5). All support sizes specified herein (for hanger rods, trapeze hangers, pipe attachments, etc.) are minimum sizes required. Contractor shall utilize larger size supports where actual loads dictate a larger support.

# 1.4 SUBMITTALS

- A. Submit and product data under provisions of Division 23 Common Requirements for HVAC Equipment.
- B. Submit product data on roof equipment curbs and supports, curb adapters, upper attachments, pipe attachments, metal framing channel and lower pipe supports.

# 1.5 WELDING REQUIREMENTS

A. Welding Requirements: All welding performed to support Mechanical piping and equipment shall comply with AWS D1.1, "Structural Welding Code - Steel".
 Welders shall be qualified per AWS and welding certificates shall be posted at the jobsite.

# 1.6 COATINGS

- A. All supports for piping and equipment, hangers and accessories, including but not limited to bolts, nuts, washers, rods, beam clamps, etc. shall be galvanized, except as indicated in the following paragraphs.
- B. Hangers and supports in direct contact with copper piping shall be copper plated.

# PART 2 - PRODUCTS

# 2.1 UPPER ATTACHMENT

- A. Steel Beams:
  - 1. Piping 2" and smaller: Malleable Iron C-Clamp with Lock Nut.
    - a. B-Line: B 3033 or B3034
    - b. C&P: 192
    - c. Anvil: 94
    - d. Erico/Michigan: 280
    - e. PHD: 350 or 360
    - f. FNW: 7203 or 7204
  - 2. Piping 2-1/2" and larger: Malleable Iron Beam Clamp.
    - a. B-Line: B 3054
    - b. C&P: 82
    - c. Anvil: 218
    - d. Erico/Michigan: 360
    - e. PHD: 630 w/25
    - f. FNW
- B. Steel Bar Joist: Malleable Iron C-Clamp with Lock Nut.
  - 1. B-Line: B 3033 or B3034
  - 2. C&P: 192
  - 3. Anvil: 94
  - 4. Erico/Michigan: 280
  - 5. PHD: 350 or 360
  - 6. FNW: 7203 or 7204

# 2.2 PIPE ATTACHMENT

- A. Copper tubing hangers: Size pipe hangers for refrigerant suction piping to fit outside insulation, with insulation shield installed between the hanger and the pipe insulation.
  - 1. B-Line: B3170CT
  - 2. C&P: 800CT
  - 3. Anvil: CT-69
  - 4. Erico/Michigan: 101
  - 5. PHD: 152
  - 6. FNW: 7015EC

- B. Steel Pipe Hangers: Size uninsulated steel pipe hangers to fit outside the piping. Size insulated steel pipe hangers to fit <u>outside</u> the insulation with insulation shield installed between the hanger and the pipe insulation.
  - 1. For Pipe Sizes 2" and Smaller:
    - a. B-Line: B3170
    - b. C&P: 800
    - c. Anvil: 70
    - d. Erico/Michigan: 100
    - e. PHD: 151
    - f. For Pipe Sizes 2-1/2" and Larger
    - g. B-Line: B3100
    - h. C&P: 100
    - i. Anvil: 260
    - j. Erico/Michigan: 400, 401
    - k. PHD: 450, 451
- C. Vertical supports shall be:
  - 1. Offset pipe clamp:
    - a. B-Line: B3148
    - b. C&P: 179
    - c. Anvil: 103
    - d. Erico/Michigan: 700
    - e. PHD: 535
  - 2. Riser clamp:
    - a. Steel:
      - 1) B-Line: B-3373
      - 2) C&P: 126
      - 3) Anvil: 2612
      - 4) PHD: 500, 551
      - 5) Erico/Michigan: 510
      - 6) FNW: 7022EP
    - b. Copper:
      - 1) B-Line: 3373CT
      - 2) C&P: 126CT
      - 3) Anvil: CT121
      - 4) PHD: 552
      - 5) Erico/Michigan: 511
      - 6) FNW: 7023EC

## 2.3 METAL FRAMING CHANNEL

A. Where possible and practical, piping may be supported with trapeze hangers consisting of a metal framing system of channel, fittings, and hardware as defined in the Metal Framing Manufacturer's Association Standard Publication MFMA-1. Length of trapeze supports shall not exceed 4 feet unless contractor performs and submits calculations which indicate the channel is within the manufacturer's recommendations with a safety factor of 30% added to the load.

- B. Vertical Pipe Supports: Where shown on the drawings, vertical routed piping shall be supported and/or stabilized by steel channel meeting the requirements for channel as specified herein.
- C. Channel shall be constructed of 12-gauge steel. Nominal width shall be 1-5/8" x 1-5/8" with a 9/16" wide and 7/8" long slot face opening, with slots on 2" centers. Channel shall be pre-galvanized in accordance with ASTM A 653 G90, or have a factory applied electro-deposited epoxy finish.
- D. Pipe clamps shall be sized as follows:
  - 1. Non-insulated Steel Piping: Sized to fit piping.
  - 2. Insulated Piping: Sized to fit outside of insulation.
  - 3. Uninsulated Copper Piping: Sized to fit outside of piping plus elastomeric isolation material.
- E. Approved Manufacturers: B-Line Model B22SH, Elcen, Unistrut, and Superstrut by Midland-Ross.

## 2.4 HANGER RODS

- A. Steel Hanger Rods: Continuous threaded rod. Size as indicated in individual piping specification sections.
- B. Rods supporting trapeze hangers shall be 1/2" unless actual loads dictate a larger rod. Rods supporting mechanical equipment shall be sized in accordance with the manufacturer's installation instructions. If no size is given, rod size shall be minimum 3/8", unless actual load dictates a larger rod. No support shall be loaded to more than 20% of its yield strength (thereby providing a safety factor of 5).
- C. Rod couplings shall be:
  - 1. B-Line: B3220
  - 2. C&P: 167
  - Anvil: 136, 136R
     Erico/Michigan: 26
  - 5. PHD: 100, 105

## 2.5 INSULATION SHIELD

- A. Provide insulation shields at all pipe hangers installed on the exterior of the insulation and at all pipe clamps and trapeze supports. Shields shall be fabricated from minimum 18-gauge galvanized steel. Shields at pipe hangers shall be 12" long with a 180-degree arc. Shields at pipe clamps shall cover entire pipe. Contractor may utilize the following shields:
  - 1. B-Line: B3151
  - 2. C&P: 265P
  - 3. Anvil: 167
  - 4. Erico/Michigan: 121
  - 5. PHD: 170
  - 6. FNW: 7750

# 2.6 EQUIPMENT BASES

- A. Bases shall be 3,000 psi concrete and provided in accordance with Division 3, Cast-In-Place Concrete.
- B. Bases shall be rectangular, unless otherwise indicated, with vertical side 6 inches from centerline of anchor bolts or 4 inches from edge of equipment, whichever provides larger dimension. Provide 1-inch chamfer on edges and corners. Provide 6-inch x 6-inch 10/10 WWF reinforcing wire at mid-depth of slabs, 6-inch deep or less, or at 1/3 and 2/3 depth of slabs thicker than 6 inches. Provide 1" clearance from adjacent walls for pumps. All equipment shall be anchor bolted to the concrete pad unless noted otherwise. Base height shall be as follows:
  - 1. Boiler 4 inches

## 2.7 SLEEVES

A. Pipe Sleeves: Pipe sleeves thru walls shall be fabricated as shown on mechanical drawings. Sleeve shall be flush with both sides of walls, unless noted otherwise on drawings.

## 2.8 ROOF MOUNTED EQUIPMENT SUPPORTS (CURB TYPE)

- A. See Section 23 81 20 for RTU-1 new roof curb.
- B. Furnish and install roof mounted equipment supports as specified below. Unless otherwise indicated, the supports shall be installed on the roof deck before the application of roofing insulation materials. All roofing membranes shall be continuous up to the nailer.
- C. Roof Curbs: 18-gauge galvanized steel, unitized construction with full mitered corners and all seams welded or bolted/screwed. Provide 1-1/2" thick, 3 lb. density rigid fiberglass insulation on the exterior or interior surfaces. Provide a 1-1/2" wide pressure treated wood nailer strip around the top perimeter above the insulation and below the top of the curb. 45° fiber cants, minimum of 4" high around perimeter of curb shall be provided. Curbs shall have vertical sides. Contractor shall verify all dimensions before ordering structural roof curb. Provide curbs for the following roof mounted equipment to be installed on new curbs:
  - 1. New gas flue through roof.
- D. Height: Roof mounted equipment supports shall be a minimum of 14" high from the base plate to the top of the curb and 12" above the roof surface. Exact height shall be determined by the supplier, by selecting a curb height that will insure the top of the flashing is a minimum of 12" above the highest elevation of adjacent roof surface.
- E. Slope: Roof mounted equipment supports shall be fabricated to incorporate a slope to match the roof slope, so that the top of the curb is level with its base plate resting flat on the roof deck.

- F. Insulation: If roof curb provider does not furnish factory installed insulation, contractor shall notify insulation contractor so that insulation contractor can indicate this in submittals and provide insulation.
- G. Manufacturer's: Pate, A.E.S., Thy, Custom Curb, Curbs Plus, S & L Manufacturing, Creative Metals, Metal Form, Shipman, Roof Products and Systems or by the equipment manufacturer of the rooftop equipment.

# 2.9 ROOF MOUNTED EQUIPMENT SUPPORTS (NON-PENETRATING TYPE)

A. Adjustable Condensate Pipe and Conduit Support on Roof: UV stabilized EPDM rubber block with tool free installation, minimum 4" long x 6" wide with adjustable height from 4" to 7" in 1/2" increments, spaced on maximum 7' centers and within 18" of fittings. Erico Caddy Pyramid Model #RPSE or equal by Pate, Curbs Plus or RPS.

#### 2.10 VIBRATION ISOLATORS

A. General: Furnish and install vibration isolators for equipment as listed below. All isolation devices shall be selected for uniform static deflections according to distribution of weight and for the lowest disturbing frequency of the unit.

# B. Isolator Types:

- 1. Type 3 Isolators: Combination spring and fiberglass (or neoprene) hangers, incorporating pre-compressed molded fiberglass (or neoprene) noise and vibration isolation pads, coated with a moisture impervious elastomeric membrane in series with springs, all encased in welded steel brackets. The spring shall have a lateral spring stiffness greater than 0.8 times the vertical stiffness. Isolators shall be designed for 50% overload capacity and shall accommodate rod misalignment over a 30-degree arc. Isolators shall have a minimum static deflection of 3/4".
- C. Piping Isolation: Suspended HVAC piping 1" diameter and over in the mechanical equipment rooms shall be isolated from the structure by means of vibration and noise control isolators. This shall apply to the first two hangers on either side of the pumps. Suspended piping shall be isolated with Type 3 isolators. A combination clevis/pre-compressed isolator is acceptable in lieu of separate clevis and separate Type 3 isolators.
- D. Manufacturers: The vibration isolators shall be manufactured by Peabody Noise Control, Mason, Vibration Isolation Co. Inc., Amber Booth, Vibro Acoustics, Vibration Mountings, Vibration Eliminator Company, Korfund, Kinetics or IAC. Isolators meeting the specification requirements which are engineered and approved by the equipment manufacturer may also be furnished by the equipment manufacturer.

## **PART 3 - EXECUTION**

# 3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support spacing requirements are specified in Sections specifying piping systems and equipment.
- B. Use galvanized hangers and supports for piping and equipment that will not have field-applied finish.
- C. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

## 3.2 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
  - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
  - 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Hanger Shield Installation: Install shield in pipe hanger or shield for insulated piping.
- D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- F. Install lateral bracing with pipe hangers and supports to prevent swaying.
- G. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, 2-1/2" and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- H. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

# 3.3 CONCRETE EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of concrete. To reduce vibration to adjacent walls, bases shall not be placed within 1/4" of adjacent walls. Obtain templates, anchor bolts, and accessories for mounting and anchoring equipment. Provide concrete bases at least 6" beyond the footprint of the equipment that the contractor provides, or as shown on the plans, whichever is larger.

## 3.4 PIPE HANGER ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

## 3.5 PAINTING

- A. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Painting Section.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.
- C. In areas that are to be painted and also are exposed to view in public areas, supports for piping and equipment, hangers and accessories including but not limited to bolts, nuts, washers, rod, angle iron, beam clamps, etc. shall be plain steel with a coat of rust inhibiting primer. Primer shall be applier <u>prior</u> to installation of supports. Supports, hangers and accessories exposed to view shall not be galvanized or electroplated, in order to allow them to be painted. Areas that are to be painted but that are not exposed to view to the public, such as mechanical rooms, shall be galvanized as required above.

## 3.6 SLEEVES AND PENETRATIONS

- A. Provide pipe sleeves for all piping and conduit penetrations through walls.
- B. Piping and Conduit Penetrations through Rated Walls or Floors: Firestopping methods and materials shall be in accordance with Architectural "Through-Penetration Firestop System" specification section. Assembly shall meet the wall or floor rating as specified by the Engineer. See Architectural drawings for rating requirements. Sleeve's size and material shall be coordinated with Architectural "Through-Penetration Firestop System" specification section.

- C. Piping and Conduit Penetrations through Non-rated Walls or Floors: Pack space between pipe or conduit and sleeve with fiberglass batts and with a minimum of 1inch thick, non-sagging caulking material on one side. Caulk material is not required to be fire rated but shall comply with Architectural caulking specification section.
- D. Install chrome plated steel escutcheons at finished surfaces for piping.
- E. Duct Penetrations through Walls: All duct penetrations through non-rated walls shall be neatly finished off on both sides of the wall. Provide sheet metal angle around full perimeter of rectangular duct on both sides of the wall and provide sheet metal escutcheon around full perimeter of round duct on both sides of the wall and seal off with FSK tape. See also detail on the drawings. Penetrations through rated walls shall be provided with fire dampers, smoke dampers, or combination fire/smoke dampers as required to provide the appropriate protection for the wall penetration. See Division 23 Air Duct Accessories, for damper material and installation requirements.

## 3.7 SUSPENDED EQUIPMENT, DUCTWORK AND PIPING SUPPORTS

A. Provide steel drop rod supports or angle iron supports, secured (spot welded or clamped in bar joist areas) to building main structural components for <u>all</u> suspended mechanical equipment, ductwork and piping. Supplemental angle iron framing shall be provided where required between bar joists and shall be minimum 3 x 3 x 1/4 for equipment and large piping (4" and larger), and minimum 2 x 2 x 1/4 for large ductwork, small equipment and small piping, and 2 x 2 x 1/8 for small ductwork and refrigerant and condensate drain piping. 1-5/8 x 1-5/8 x 12-gauge channel may be used to span bar joist in lieu of 2 x 2 x 1/4 angle provided that previous paragraph "Performance Requirements" are met. Contractor shall note that supplemental angle sizes are minimum. Contractor shall provide larger size supplemental angle iron framing as appropriate to safely and appropriately support equipment. Provide vibration isolation where specified. Provide securely tightened lock nuts on all drop rod supports and connections.

## 3.8 ROOF MOUNTED EQUIPMENT SUPPORTS

- A. Coordinate with General Contractor to insure full perimeter structural steel framing is provided either under Division 5 or herein, around all roof mounted equipment supports. Framing must comply with requirements of Division 5.
- B. All curb mounted equipment shall be anchored to the curb/nailer with cadmium plated anchors, minimum 5/16" x 1-1/2" hex head screws, on 12" centers. Provide minimum two screws per side. Where roof mounted equipment manufacturer's requirements exceed the above requirements, provide installation complying with manufacturer's requirements.

## **END OF SECTION**

## **SECTION 23 05 53**

# IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation:
  - 1. Equipment nameplates.
  - 2. Equipment markers.
  - 3. Pipe markers.

## 1.3 SUBMITTALS

A. Product data for each type of product included herein shall be submitted under provisions of Division 23 - Common Requirements for HVAC Equipment.

# 1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

#### 1.5 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

# PART 2 - PRODUCTS

## 2.1 NAMEPLATES

A. General: Provide nameplates for all equipment and panel mounted controls. Location shall be accessible and visible.

B. Equipment Nameplates: Metal with data engraved or stamped, permanently attached to equipment. As a minimum, nameplate shall include manufacturer, model number, serial number and electrical data.

# 2.2 EQUIPMENT MARKERS

- A. Markers shall be Contractor fabricated to have equipment "tag" or number (e.g., VAV-1, RTU-1, FB-1, B-1, etc.) on marker.
- B. Designation:
  - Equipment tag shall be etched in 1/4" maximum, 1/8" minimum height letters and mounted on or adjacent to device cover or attached to the item of equipment. For items above ceiling, marker shall be attached to ceiling on t-bar grid in location approved by Owner.
  - 2. Type: White core black bakelike secured with epoxy glue or screws, unless otherwise noted.
  - 3. Some specific pieces of equipment or controls are identified as having equipment markers with customized messages. These include the following, and the customized messages are identified on the floor plans:
    - a. Boiler Emergency Shutdown Switches
    - b. Carbon Monoxide Sensor.

#### 2.3 IDENTIFICATION OF PIPING

- A. Piping shall be labeled with pre-tension pre-coiled semi-rigid plastic snap-on pipe markers equal to Seaton "Setmark" pipe markers or by Brimer or Brady, or self-adhesive plastic pipe markers with pressure sensitive, permanent type self-adhesive back, or field stenciled if pre-made marker is not manufactured. Provide arrow identifying direction and system description as listed below. Background and letter colors shall be in conformance with latest version of ANSI/ASME A13.1. The following piping systems shall be provided with pipe markers.
  - 1. Heating hot water
  - 2. Condensate
- B. Height of letters shall be as follows:
  - 1. Outside Diameter (Outside insulation on insulated piping)
    - a. 1/2" 1-1/4": Letter height shall be 1/2"
    - b. 1-1/2" to 2": Letter height shall be 3/4"
    - c. 2-1/2" to 6": Letter height shall be 1-1/4"

## **PART 3 - EXECUTION**

## 3.1 EQUIPMENT IDENTIFICATION

A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible.

- B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.
  - 1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  - 2. Data: Equipment "tag".
  - 3. Locate markers where accessible and visible.
- C. The following pieces of equipment located above ceilings shall be identified with bakelite label equipment markers attached to the ceiling grid in a location approved by the Owner, near the equipment.
  - 1. Each ducted fan coil unit
  - 2. Each concealed branch controller

## 3.2 PIPING IDENTIFICATION

- A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
  - 1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pre-tensioned pipe markers. Use size to ensure a tight fit.
  - 2. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 3/4-inch wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
- B. Locate pipe markers and color bands as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 4. Near major equipment items and other points of origination and termination.
  - 5. At 25 feet intervals on all straight runs of pipe.
  - 6. On both sides of walls or floors where pipe passes through walls or floors.

## 3.3 ADJUSTING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

## 3.4 CLEANING

A. Clean faces of mechanical identification devices to an "as new" condition immediately prior to Final Certification.

#### **END OF SECTION**

#### **SECTION 23 05 93**

# TESTING, ADJUSTING, AND BALANCING FOR HVAC

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes TAB to produce design objectives for the following:
  - 1. Air Systems.
  - 2. Hydronic Piping Systems.
  - 3. Verifying that automatic control devices are functioning properly.
  - 4. Reporting results of activities and procedures specified in this Section.

## 1.3 SUBCONTRACTOR COORDINATION

A. Testing, Adjusting and Balancing (TAB) work shall be performed by NEBB/AABC certified firm as described in this section of the specifications; however, all devices that the TAB agent will be required to perform work on described in this section, shall be provided by the Contractors' Division 23 mechanical sub-contractor(s). These devices include, but are not limited to: balancing dampers, "Petes" plugs, reinsulation of ductwork after duct test holes are drilled by TAB agent, adjustable sheaves, pulleys, belts, balance valves, etc. and the labor to install these devices. Sub-contractor(s) providing the Division 23 HVAC systems must provide labor to support the TAB Agent. The mechanical systems shall be fully operational and ready for TAB work to begin a minimum of four weeks prior to the Contractual date of "Substantial Completion". Additionally, the Division 23 Contractor(s) shall furnish a qualified technician(s)/mechanic(s) to assist the TAB agent in the performance of his duties until all work specified herein is accomplished. The Division 23 sub-contractor(s) shall correct all deficiencies found by the TAB agent.

#### 1.4 DEFINITIONS

- A. Adjusting: The varying of system flows by partially closing balancing devices, such as dampers and valves, and varying fan speeds to achieve optimum system operating conditions within design and installation limits.
- B. Balancing: The methodical proportioning of air and hydronic flows through the system main branches, and terminal devices using acceptable procedures to achieve the specified airflow or hydronic flow within installation, testing and design limitations.

- C. TAB: Testing, adjusting, and balancing. A systematic process or service applied to HVAC systems and other environmental systems, to achieve and document air and hydronic flow rates.
- D. Test: A procedure to determine quantitative performance of systems or equipment.
- E. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

#### 1.5 SUBMITTALS

- A. Qualification Data: Within 45 days from Contractor's Notice to Proceed, submit 4 copies of evidence that TAB firm and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Sample Report Forms: Submit one set of sample TAB report forms. Forms are to be project specific for the systems to be tested, adjusted and balanced.
- C. Contract Documents Examination Report: Within 45 days from Contractor's Notice to Proceed, submit an electronic copy of the Contract Documents review report as specified in Part 3.
- D. Certified Final TAB Reports: Submit four hard copies and one electronic copy of reports prepared on approved forms certified by TAB firm.

## 1.6 QUALITY ASSURANCE

- A. TAB Firm Qualifications: Engage a TAB firm certified by either AABC or NEBB. Test and balancing by non-AABC or non-NEBB firms is not allowed.
- B. TAB Report Forms: Use standard forms from AABC's "National Standards for Total System Balance" or NEBB's most recent "Procedural Standard for Testing, Adjusting, and Balancing of Environmental Systems."
- C. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Total System Balance" or NEBB's most recent copy of "Procedural Standard for Testing, Adjusting, and Balancing of Environmental Systems," Section 4, "Standards for Instruments and Calibration."
- D. Instrumentation Calibration: Calibrate instruments at least every twelve months or more frequently if required by instrument manufacturer.
  - 1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

## 1.7 OCCUPANCY DURING TAB PROCEDURE

A. Owner Occupancy: TAB agent shall verify if Owner will occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

## 1.8 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times. Test and Balance Agent shall contact Engineer and Owner 10 working days prior to test and balance work to allow (but not require) Engineer and owner to be present during TAB work.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

## 1.9 WARRANTY

- A. Performance Guarantee:
  - 1. Provide one of the following:
    - a. For AABC Certified Firms: Provide a guarantee stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents.
    - b. For NEBB Certified Firms: Provide a guarantee stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee for either AABC or NEBB shall include the following provisions:
      - 1) The certified TAB firm has tested and balanced systems according to the Contract Documents.
      - 2) Systems are balanced to optimum performance capabilities within design and installation limits.
- B. TAB work shall be guaranteed by AABC or NEBB. Submit copy of AABC or NEBB National Performance Guaranty when final balance report is submitted. If for any reason, the TAB agency fails to comply with the specifications, with the exception of termination of business by the TAB agency, equipment malfunction or inadequacy, which prevents proper balancing of the systems, the Associated Air Balance Council or NEBB shall provide supervisory personnel to assist the TAB agency to perform work in accordance with AABC or NEBB standards. As part of this Performance Guaranty, the engineer or building owner may call upon AABC or NEBB to assist him with any technical and/or field problems pertaining to the final balanced condition of the systems. These services will be made available at no additional charge by the TAB agency or by AABC or NEBB.

# PART 2 - PRODUCTS (Not Applicable)

## **PART 3 - EXECUTION**

## 3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment. Provide Contract Documents Examination Report to report on acceptability and/or deficiencies in Contract Documents.
  - 1. Contract Documents are defined in the General and Supplementary Conditions of Contract.

- 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
- D. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- E. Report deficiencies discovered before and during performance of TAB procedures.

## 3.2 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" or NEBB's most recent "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

## 3.3 SAFETY CONTROLS DATA

A. Provide unit designation or location with description of device and setpoint. Activate and verify operation of all safety devices. Smoke detectors shall be activated with smoke. Test button activations is not acceptable.

#### 3.4 GENERAL PROCEDURES FOR TESTING ADJUSTING AND BALANCING

A. Air and Hydronic systems shall be Tested and Balanced using the procedures outlined in NEBB's most recent copy of "Procedural Standard for Testing Adjusting and Balancing of Environmental Systems", or AABC's "National Standards for Total System Balance".

# 3.5 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform TAB of existing systems to the extent indicated by the contract documents.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Deficiencies noted in the preconstruction report shall be brought to the attention of the Owner. After the Owner has corrected deficiencies, TAB of existing systems may be performed. TAB contractor shall ensure that the owner has performed the following tasks:
  - 1. All existing hydronic strainers serving the baseboard heating system have been cleaned and replaced.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
  - 1. Air balance each air outlet, and each hydronic circuit to indicated flow rates (+/- 10%) for all existing low pressure supply duct and for all existing hot water heating systems (baseboard heaters).

## 3.6 FUNCTIONAL PERFORMANCE TESTING

- A. Check free travel and proper operation of control devices such as damper and valve operators.
- B. Sequence of Operation Verification
  - The TAB Contractor shall witness and document the complete HVAC 1 sequence of operation. The HVAC Control Contractor shall demonstrate each control sequence by simulating conditions, modifying setpoints, and/or overriding existing values. All safeties shall be tested by the HVAC, and/or Controls Contractor. The TAB contractor shall witness and document the test procedures and the results of all tests required to perform the approved sequence of operation and to test all safeties. The TAB Contractor shall report all deficiencies to the General Contractor, HVAC Contractor, and HVAC Controls Contractor for resolution. After correction of deficiencies, the TAB Contractor shall return to witness correction of the deficiencies. (HVAC and/or HVAC Controls Contractor are to perform the required tests in the presence of the TAB Contractor.) After all Functional Performance Tests are performed and passed, the TAB Contractor shall include each sequence of operation, test procedure used to perform the required test, and the results of each test procedure in the Final TAB Report.

- 2. After completion of Functional Testing and issuance of the Final TAB Report, the TAB, HVAC, and HVAC Controls Contractor(s) shall demonstrate to the Architect/Engineer a 10% random sample (Chosen by the Architect/Engineer) of the sequence of operation. If any of the tests are failed, the Architect/Engineer may request that the Functional Performance Testing be re-performed by the contractors and a revised TAB Report issued. A return visit can be requested by the Architect/Engineer for the contractors to perform a different 10% sample of the approved sequence of operation in the presence of the Architect/Engineer. This may continue at the Architect/Engineer's discretion until a random 10% sample of the approved sequence of operation be properly demonstrated to the Architect/Engineer.
- C. Note operation of electric actuators using spring return for proper fail-safe operations.

# 3.7 HYDRONIC BALANCE PERFORMANCE REQUIREMENTS

- A. Measurements: Flow meters, venturis, balancing valves, or pressure compensating flow control valves with flow taps shall be used to balance water flows. Where these items are not installed, flow rates shall be obtained by pressure drop across valves or equipment using factory provided C<sub>V</sub> data (known pressure drops vs. flow curves through heat exchanger). If no provision is available for actual flow measurements as listed above, balancing shall be performed by the temperature differential method, but the temperature differential method shall be performed only after specified air balancing has been completed. Pump flow rates shall be measured by flow meters, balancing valves with flow taps, or differential pressure measurements.
- B. Adjustments: All hydronic circuits shall be adjusted by the use of the specified balancing valves. All balancing valves shall be permanently marked after balancing is completed so they may be returned to the correct position if disturbed.

## 3.8 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 10 percent to minus 10 percent.
  - 2. Air Outlets and Inlets: Plus 10 percent to minus 10 percent.
  - 3. Heating-Water Flow Rate: Plus 10 percent to minus 10 percent.

# 3.9 PRE-REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

## 3.10 SEASONAL BALANCING AND ADJUSTMENTS

- A. Site Visit: The Test and Balance Subcontractor shall schedule two seasonal tests of the HVAC system. These seasonal tests shall be conducted once with the system in heating cycle (below 50°F outside air temperature) and once with the system in the cooling cycle (above 90°F. outside air temperature). If the initial test and balance work is performed outside these parameters, then two additional tests will need to be done to meet this requirement. If the initial test and balance work is performed within these parameters, only one additional test is required in the opposite season. The Architect and/or Owner shall witness all the final readings of the tests to verify accuracy and completeness of the tests. Provide 48 hours notice to the Architect and Owner in advance of these visits. The HVAC Control Contractor shall participate in Seasonal Balancing and Adjustments to provide control support to the TAB contractor.
- B. Objective: The objective of the visits shall be to test all HVAC equipment at or near design conditions in both heating and cooling modes, and make adjustments of the airflow to each room to provide uniform space temperatures.
- C. Seasonal Observations, Balancing and Adjustments Reports: Provide, in report form, four copies of the seasonal balancing and adjustments visits within five days of the site visits to the Architect for review by the Engineer. The following information shall be included in the reports.
  - 1. Date of site visit
  - 2. Outdoor air DB and WB temperatures during the test period.
  - 3. All coil/heat exchanger performance data at or near design conditions that was not previously measured and recorded.
  - 4. Summarize observations and include a tabulation of any corrective action and adjustment taken including rebalancing and/or adjustments.
  - 5. List of any deficiencies observed. Where deficiencies had been noted on initial balancing report, provide data regarding any corrective work undertaken and results of corrective action.
  - 6. Provide signed statement to the Owner that seasonal balancing and adjustments work has been done.

#### 3.11 CERTIFIED FINAL TAB REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. The content for the Certified TAB Report shall include all content and data required by the firms certifying agency (AABC or NEBB) for each system or component included in the scope of work. In addition to this data and content, the Final TAB Report shall contain all content and data listed in this section.
- C. Functional Performance Testing
  - 1. Provide written verification of complete sequence of control system operation.

- D. Duct Mounted Smoke Detectors and Smoke Dampers
  - 1. Installed Unit Data:
    - a. Unit designation or installed location
    - b. Manufacturer
    - c. Model Number
  - 2. Testing and Data:
    - a. Activate with smoke and verify proper operation. Provide installed unit data and confirm operation. (Test button activation is not acceptable).
    - b. Verify all smoke dampers close when emergency HVAC shutdown is activated.
    - c. Verify all specified equipment shuts down when emergency HVAC shutdown is activated.
- E. Economizer System Data (Note that Economizer data may need to be collected during Seasonal Testing.)
  - 1. Economizer activation outdoor air dry-bulb, setpoint and actual
  - 2. Supply air temperature during economizer, design and actual
  - 3. Building space pressurization control set points (fan start, fan stop) and actual delta P.
  - 4. Economizer exhaust fan CFM, ESP, RPM, BHP, HP
  - 5. All motor data as indicated in previous paragraph and all drive data as indicated in previous paragraph.
  - 6. Verify barometric dampers, if used, open to relieve air and verify outdoor air damper moves to fully open position.
  - 7. Verify outdoor air damper returns to minimum position when economizer is not activated.

#### 3.12 INSPECTIONS

- A. Initial Inspection:
  - 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
  - 2. Randomly check the following for each system:
    - a. Measure airflow of at least 10 percent of air outlets.
    - b. Measure water flow of at least 5 percent of terminals.
    - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
    - d. Verify that balancing devices are marked with final balance position.
    - e. Note deviations to the Contract Documents in the Final Report.

## B. Final Inspection:

- 1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Owner and Architect and Engineer.
- 2. TAB firm test and balance engineer shall conduct the inspection in the presence of Owner and Architect and Engineer.

- 3. Owner and Architect and Engineer. shall randomly select measurements documented in the final report to be rechecked. The rechecking shall be limited to either 10 percent of the total measurements recorded, or the extent of measurements that can be accomplished in a normal 8-hour business day.
- 4. If the rechecks yield measurements that differ from the measurements documented in the final report by more than +-10%, the measurements shall be noted as "FAILED."
- 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- 6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
- 7. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

## 3.13 ADDITIONAL TESTS

A. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near-peak summer and winter conditions.

## 3.14 REPORT

- A. Provide four copies of the Test and Balance report to the Architect/Engineer by the earlier of the following two dates:
  - 1. A minimum of 48 hours prior to the semi-final on-site project construction site review by the Architect/Engineer.
  - 2. Four weeks prior to the date the facility is scheduled to be turned over to the Owner.
- B. TAB work shall be guaranteed by AABC or NEBB. Submit copy of AABC or NEBB National Performance Guaranty when final balance report is submitted. If for any reason, the TAB agency fails to comply with the specifications, with the exception of termination of business by the TAB agency, equipment malfunction or inadequacy, which prevents proper balancing of the systems, the Associated Air Balance Council or NEBB shall provide supervisory personnel to assist the TAB agency to perform work in accordance with AABC or NEBB standards. As part of this Performance Guaranty, the engineer or building owner may call upon AABC or NEBB to assist him with any technical and/or field problems pertaining to the final balanced condition of the systems. These services will be made available at no additional charge by the TAB agency or by AABC or NEBB National Headquarters.

**END OF SECTION** 

## **SECTION 23 07 16**

# **HVAC EQUIPMENT INSULATION**

#### 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 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.3 SUMMARY

- A. This Section includes mechanical insulation for duct, equipment, and pipe, including the following:
  - 1. Insulation materials
  - 2. Fitting materials.
  - 3. Insulation finish materials
  - 4. Accessories

#### 1.4 SUBMITTALS

- A. Product data shall be submitted under provisions of Division 23 Common Requirements for HVAC Equipment for each type of product indicated; identify thermal conductivity, thickness, and jackets (both factory and field applied, if any). Provide a sheet that identifies each system (e.g., water piping, supply duct, etc.), and the submitted material, thickness, and finish for each system.
- B. Submit proof of three years minimum experience in insulation installation.

## 1.5 QUALITY ASSURANCE

- A. Insulation and related materials shall meet the requirements of NFPA-90A.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing products per ASTM E 84. Factory label insulation and jacket materials and adhesive, mastic, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
  - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Applicator: Company specializing in insulation application with three years minimum experience.

## 1.6 GENERAL INSULATION NOTES

- A. Any HVAC equipment which is factory insulated, and which has sweating/condensation forming on the equipment while operating under design conditions, shall be replaced or field insulated by the contractor until the condensation is eliminated.
- B. Piping and ductwork is considered concealed for purposes of this Specification Section when located above ceilings or in chases.

#### PART 2 - PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURERS

- A. Certain Teed, Owens-Corning, Johns Manville, Armacell, IMCOA, Nomaco, Knauf, Pittsburg Corning, The Dow Chemical Company, Dyplast, Foster, Childers and Hi-Therm.
- B. Substitutions: Under provisions of Division 23 Common Requirements for HVAC Equipment.

## 2.2 INSULATION MATERIALS

- A. I1: Glass fiber insulation; ANSI/ASTM C547; 'k' value of 0.24 at 75 degrees F. Jacket shall be factory applied all service jacket with self sealing lap (ASJ-SSL).
   Provide ASJ tape where insulation butts. ASJ jacket shall be continuous. Provide insulation shield on exterior of insulation at all hangers.
- B. I2: Preformed flexible elastomeric expanded closed-cell pipe insulation having a flame spread rating of 25 or less and a smoke density of 50 or less when tested by ASTM E-84 method. Temperature range -40°F to 220°F. Insulation shall be CFC and HCFC free and formaldehyde free. Thermal conductivity of 0.27 btu-in/hr sq. ft °F at 75°F mean temperature. All seams and butt joints shall be sealed with factory applied adhesive. Provide insulation shield on exterior of insulation at all hangers.
- C. I3: Blanket Insulation: Glass fiber blanket insulation minimum 3/4 lb. density, installed R3.5 per inch, with FSK facing. On ductwork, wrap blanket insulation around duct, being careful not to compress it more than 25% at the corners, butting insulation and overlapping facing jacket 2" minimum at all joints. Two-inch (2") thick insulation shall have a minimum R5.3 at 25% compression. Where scheduled, provide 3" thick insulation with installed R8.0. Staple the overlap with outward clinching staples a maximum of 3" on centers. For ducts over 30" wide, additionally support insulation on bottom of horizontal ducts and sides of vertical ducts with rows of welded or adhered clips and washers on not more than 18" centers. Seal all joints and clips with pressure sensitive FSK tape. Seal all penetrations, such as at duct supports, and all terminations of insulation with pressure sensitive FSK tape.

- D. I4: Flexible elastomeric expanded closed-cell similar to that specified as the preformed "I2" insulation specified herein.
- E. I5: Internal fiberglass duct liner as specified in Division 23 Metal Ducts.
- F. II1: Internal closed cell elastomeric "Armacell" duct liner as specified in Division 23 "Metal Ducts".

## 2.3 FITTING INSULATION MATERIALS

A. Type P1: Precut fiberglass insulation fitting inserts covered with PVC fitting covers. PVC fitting covers shall have a flame spread of 25 or less and a smoke development of 50 or less. Nominal 0.75 lb. density, K factor maximum 0.32 at 75°F for temperatures -20°F to 450°F.

## 2.4 INSULATION FINISH MATERIALS

- A. F1: Two coats of Armacell Armaflex finish or equal
- B. F2: Pre-molded PVC jacket, maximum permeance of 0.09. PVC jacketing shall be minimum 0.02" thick (20 mils).
- C. F6: 0.010" Aluminum jacketing with joints sealed watertight with sealant, Foster Elastolar 95-44, Childers Chil Byl CP-76 or prior approved equal and metal jacket bands.

# 2.5 ACCESSORIES

- A. Metal Jacket Bands: 1/2-inch wide; 0.015-inch thick aluminum.
- B. Adhesives: Compatible with insulation materials, jackets and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- C. Insulation Shields: Provided in accordance with Division 23 Hangers and Supports for HVAC Piping and Equipment.
- D. Mastics: Materials shall be compatible with insulation materials, jackets, and substrates.
- E. Tapes: FSK foil face, vapor retardant type tape matching factory applied jacket with acrylic adhesive; complying with ASTM C1136 and UL listed. Width shall be three inches; thickness shall be 6.5 mils.

#### PART 3 - EXECUTION

## 3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

## 3.2 COORDINATION

- A. Coordinate with contractor to confirm (based on contractor's preference) which sections of piping will be welded and which sections of piping shall be grooved. See Part 3 "Execution" herein for additional insulation requirements specific to grooved piping system.
- B. Coordinate with trade installing piping to verify all piping has been pressure tested prior to application of insulation.

## 3.3 COMMON INSTALLATION REQUIREMENTS

- A. Install insulation, fitting materials, finish materials and accessories in accordance with manufacturer's installation requirements and recommendations.
- B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- C. Install insulation with longitudinal seams at top and bottom of horizontal runs. Install multiple layers of insulation with longitudinal and end seams staggered. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- D. Keep insulation materials dry during application and finishing.
- E. Install insulation with least number of joints practical.
- F. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic (Type F3).
- G. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- H. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- I. Continue insulation with vapor barrier through penetrations. At fire dampers, smoke dampers, and fire/smoke dampers, extend insulation to wall on both sides of wall and seal.
- J. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- K. On insulated piping without vapor barrier and piping conveying fluids 140 degrees F (60 degrees C) or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation with mastic (Type F3) at such locations.

- L. Insure duct access panels are not blocked by the installation of external duct insulation.
- M. For above ambient service, do not install insulation to vibration control devices, testing agency labels, nameplates or cleanouts ASME stamps, etc.
- N. Internal Acoustical duct liner is specified in certain ducts for acoustical purposes to reduce high frequency noise. These ducts may also be specified with external duct insulation. The Contractor is not permitted to omit specified external duct insulation (duct wrap, duct board, etc.) just because the duct is also lined.

# 3.4 INSULATION SCHEDULE

	INSULATION		FINISH		
Service/Location	Pipe/Duct Fitting		Thickness Pipe/Duct Fitting		
PIPING:					
Space Heating Hot Water Piping:					
Concealed, 1/2" to 1"	I1	P1	1/2"		
Concealed, 1-1/4" to 2"	I1	P1	1"		
Concealed, 2-1/2" and up	I1	P1	1-1/2"		
Run Outs to Terminal Units	I1	P1	1/2"		
Or					
Run Outs to Terminal Units	I2	I2	1/2"	F1	F1
Exposed Inside, 1/2" to 1"	I1	P1	1/2"	F2	P1
Exposed Inside, 1-1/4" to 2"	<b>I</b> 1	P1	1"	F2	P1
Exposed Inside, 2-1/2" and up	<b>I</b> 1	P1	1-1/2"	F2	P1
Condensate Piping:					
All Other Condensate Piping, Concealed PVC or Copper	I2	I2	1/2"		
All Other Condensate Piping, Exposed Copper	I2	I2	1/2"	F1	F1
All Other Condensate PVC Piping, Exposed (in conditioned space)	I2	I2	1/2"	F1	F1
Chemical Feed Piping and Expansion Tank Piping Serving Hot Water System	Same	Same as Hot Water Piping System			
DUCT:					
Return/Relief Air Duct	15	I5	1"		
Medium Pressure Supply Duct	13	I3	2"		
Transfer Air Duct					

Service/Location	INSULATION FINISH Pipe/Duct Fitting Thickness Pipe/Duct Fitting				
EQUIPMENT:					
Mechanical Equipment	Shall have factory installed insulation to prevent condensation or excessive heat loss/gain				
New and Existing Supply Diffusers	Provide 2" of I3 insulation blanket atop ceiling supply diffusers				
Hot Water Expansion Tanks	One inch of type I4 with F1 finish				
Hot Water Air Separators	One inch of type I4 with F1 finish				
One Shot Chemical Treatment Tanks	Not insulated (valves to tank are normally closed)				
Roof Curbs	If contractor utilizes roof curbs furnished by roof curb equipment manufacturers, and if roof curbs are not factory insulated, insulation contractor shall insulate curbs with 1-1/2" thick 3-pound density rigid fiberglass insulation on the interior or exterior surfaces.				

END OF SECTION

## **SECTION 23 09 00**

## INSTRUMENTATION AND CONTROL FOR HVAC

#### PART 1 - GENERAL

## 1.1 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for equipment not supplied with factory-wired controls.

## 1.2 WORK INCLUDED

- A. Complete control system for all heating, ventilating and air conditioning (HVAC) systems and exhaust systems including all integral and field mounted devices and control wiring. All control components shall be provided under this section of the specifications unless specifically provided elsewhere. A complete and fully operational control system shall be provided for all mechanical systems furnished under Division 23 to achieve the sequence of control specified: herein or as required to achieve proper operation of the equipment.
- B. This system shall include all devices specified herein and shall include, but is not limited to; main DDC panels, standalone DDC controllers, software, graphics package, temperature sensors, conventional thermostats, humidity sensors, relays, switches, contactors, variable frequency drives, control valves, transformers, differential pressure switches, CO sensors, etc.
- C. This project includes maintaining the operation and control functions of many existing to remain pieces of HVAC equipment, including but not limited to Rooftop Exhaust Fans

## 1.3 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 23 Common Requirements for HVAC Equipment to the Owner and Architect/Engineer.
- B. Each submittal shall contain the following information, as appropriate based on this particular project.
  - 1. DDC control riser diagram showing all DDC controllers, and network wiring.
  - 2. Single line schematics and flow diagrams showing the location of all control devices.
  - 3. Points list for each DDC controller with input/output schedule.
  - 4. Vender's own written description for each sequence of operation.
  - 5. Detailed bill of material for each panel.
  - 6. Control damper schedule.
  - 7. Control valve schedule
  - 8. Catalog cut sheets for all equipment used, including but not limited to: sensors, thermostats, humidistats, actuators, etc.
  - 9. DDC panel data.
  - 10. Submittal drawing index sheet with control system legend.

- C. Controls contractor shall not order material or begin field installation until receiving approved submittals.
- D. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and terminal to terminal control wiring, clearly indicating factory-installed and field-installed wiring associated with all equipment. Wiring diagrams shall show all point-to-point wiring connections between all components of the control system. No devices, conduit or wiring shall be installed until Contractor has received approved shop drawings from the Architect/Engineer.
- E. Field quality-control test reports.
- F. Operation and Maintenance Data: For HVAC instrumentation and control system, submit under the provisions of Division 23 Closeout Document Requirements for HVAC.

## 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with ASHRAE 135 for DDC system components.
- D. Complete control system and submittal data for this system shall be prepared and provided by a factory authorized representative of the Control System Manufacturer with a minimum of five (5) years experience in control systems of similar size and complexity. The control system manufacturer must be able to demonstrate 5 similar projects with control systems operating successfully in the field for a minimum of five years.
- E. The control contractor shall be a factory authorized branch office that is regularly engaged in the engineering, programming, installation and service of the control systems of similar size and complexity. The controls contractor shall have a local branch office with a 100-mile radius of the job site. Emergency service shall be available on a 24 hour, seven day a week basis.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.
- B. Store products in manufacturer's unopened, labeled packaging until ready for installation. Store products within the range of manufacturer's absolute limits for environmental condition including, but not limited to, temperature/humidity.

## 1.6 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

#### 1.7 WARRANTY

- A. See Division 23 Closeout Document Requirements for HVAC for warranty information.
- B. Warranty shall cover all costs for parts, labor, travel and expenses for a period of one year from completion of system acceptance. Warranty shall apply to both hardware and software.
- C. Emergency Service: The controls contractor shall restore the control system to proper operating condition within 24 hours after receiving a request for service.

#### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

A. Provide a system of controls as manufactured by Trane. The Architect/Engineer/Owner will consider alternate systems for other manufacturers provided they are submitted to the Engineer 20 days prior to bid date.

## 2.2 WIRING

A. All control wiring (including but not limited to control, interlock, sensor, thermostat, etc.) shall be provided under this section of these specifications. If 120-volt AC power for control devices is required and if Division 26 electrical drawings do not indicate 120-volt AC is provided to control devices, the control contractor is responsible for providing 120-volt AC as specified herein.

## 2.3 CONTROL COMPONENTS AND THEIR FUNCTION

- A. Cabinets: Provide and install control cabinets constructed of heavy gauge steel or aluminum and consisting of a one piece rectangular or square ring, a sub-panel and a door with continuous hinge, and quick turn latch with keyed lock. Unless otherwise specified, all controllers, and other equipment furnished as part of the control system which are not required to be mounted on mechanical equipment shall be cabinet mounted. All wiring connections shall be made inside the cabinet. All electrical devices shall be wired to a numbered terminal strip. No field wiring shall be required within the cabinet except to the terminal strip.
- B. Conduit and Raceway: Provide and install under this section.
  - 1. Refer to Division 26 Electrical for material requirements for conduit and flexible conduit. Conduit sleeves with bushing shall be provided at all control wiring penetrations through walls.
  - 2. Outlet Boxes: Refer to Division 26. Provide and install under this section.

#### C. Conductors:

- 1. 50 to 600 volts: Refer to Division 26 for requirements.
- 2. Below 50 volts: Minimum size for individual conductors is AWG. No. 18. Minimum conductor sizes for multi-conductor cables is AWG No. 22. Provide shielded cable as required to avoid EMI where conduits natural shielding effect is insufficient. Conductors shall be sized within acceptable voltage drop parameters.
- 3. Plenum Rated Cable: Plenum rated cable with flame spread of 25 or less and smoke development of 50 or less as tested by ASTM-E84.
- 4. Conductor Insulation: "TFFN", unless noted otherwise.
- 5. Taps and Joints: Mechanically and electrically sound.
- 6. Tape: Per Division 26. Provide and install under this section.
- 7. Lacing: Per Division 26. Provide and install under this section.
- 8. Lubricants: Per Division 26. Provide and install under this section.
- 9. Color Code: All low voltage control conductors shall be color coded by factory or provided with numbered ends.
- D. Contactors and Control Relays: Relays for control purposes shall be the plug-in type with plastic enclosure surrounding the relay with contacts rated for a minimum of 110VAC and 24VDC. Relay shall operate properly over -25°C to 55°C ambient. Relay shall be UL recognized. Pick up voltage shall be a maximum of 80% of nominal and drop off voltage shall be a maximum of 30% of nominal. Contact rating, in-rush current, number of poles, coil voltage, etc. shall be appropriate for the application. Provide neon or LED "ON" indicator lamp.
- E. HVAC Shutdown Relay: An HVAC shutdown relay shall be provided by Division 26 and shall be located near the DDC panel. Certain HVAC equipment shall be wired through this "HVAC Shutdown Relay" to achieve the control sequence specified herein. All noted equipment in Part 3 "Execution" shall shutdown in the event of closure of this HVAC shutdown relay which is activated by the main fire alarm panel.
- F. Control Transformer: Provide transformers at all equipment as necessary to power control system. Provide at <u>each</u> piece of equipment with a field mounted DDC controller a field mounted 24V control transformer adequately sized for the DDC controller and other controls required for proper unit operation. Transformers shall be protected with in-line fuses on both the primary and secondary sides in accordance with Table 450.3(B) of the National Electric Code, unless the following primary current conditions apply. Transformers with a primary current less than 2 amperes shall be permitted to be fused on the primary side only provided the fuses do not exceed 300% of the transformer's rated primary current. Transformers with a primary current less than 9 amperes shall be permitted to be fuse protected on the primary side only provided the fuses do not exceed 167% of the transformer's rated primary current. If control contractor intends to utilize any on board transformer provided by the HVAC equipment manufacturer, he shall provide signed statement from the equipment manufacturer indicating the allowable additional "VA" load that is available for additional devices.

- G. Water Control Valves: Water control valves shall be properly sized for the application with a minimum valve authority (beta or B) for modulating valves greater than or equal to 0.50. Valve authority is defined as pressure drop across fully open control valve divided by the pressure drop of the entire coil circuit. The pressure drop across the entire coil circuit includes the fully open control valve pressure drop, the coil pressure drop, and all coil piping accessory components pressure drops, including strainers, elbows, tees and shutoff valves. Coil circuit is defined as the components between supply shut off valves and return shut off valve. Controls contractor shall verify approved coil pressure drops at scheduled gpm, and calculate beta, and list beta in submittal. Controls contractor may use two feet (2') head as estimated pressure drop of coil piping accessory components in lieu of detailed pressure drop takeoff, if desired. Valves for isolation (not modulating control) duty shall be line sized. In no event shall valves be more than two pipe sizes smaller than their connecting pipe size (line size). For each hydronic system, valves shall operate (open, close) against a differential pressure equal to 120% of the maximum pressure capable of being generated by the particular pump the Contractor chooses to furnish. Valves shall have minimum 125 psi rating. Valves shall be, electronic spring or reversible motor return as scheduled on the drawings capable of receiving an input signal, suitable for open/close or modulating control as indicated on the drawings/specifications and designed to accept the appropriate actuator. Valve components shall be suitable for temperature range valve will experience. Valves shall be 3-way as indicated on the drawings, brass or cast iron body, and designed specifically for its application. Flow characteristics of hot water valves and chilled water valves shall be equal percentage type. Provide stainless steel trim or bronze trim, as required, to achieve maximum differential pressure rating. Valve schedule Contractor submits shall be arranged as follows:
  - 1. Valve Tag #: (1, 2, 3, etc.)
  - 2. Equipment Served: (AHU-1, FCU-1, etc.)
  - 3. Service: (Heating, Cooling, etc.)
  - 4. Fail Position: (Bypass Coil)
  - 5. Valve Model No.:
  - 6. Size: (1/4-inch, 1/2-inch, etc.)
  - 7. CV
  - 8. Valve Authority (Beta)
  - 9. Approved Coil Pressure Drops
  - 10. Capacity Gpm:
  - 11. Differential Pressure Rating, PSI:
  - 12. Valve Pattern: (3-way, 2-way, etc.)
  - 13. Pressure Drop at Rated Flow, PSI:
  - 14. Flow Control: (2-position, Modulating, etc.)
  - 15. Actuator Type: (24 volt, 120 volt, etc.)
  - 16. Required Differential Rating, PSI: (1.2 x maximum pump D.P.)
- H. Variable Air Volume (VAV) and Fan Powered Box (FPB) Control Valves: control valves shall be full port, two-way or three-way as scheduled on the drawings, modulating-position ball valves with electric/electronic actuators. Valve shall have minimum 125 psi static pressure rating. Ball valve size shall match the size of the valve components shown on the "Hot Water VAV Box Piping Detail" and "Fan Powered Box Detail." Valve shall have forged brass body with chrome-plated brass ball with EPDM or graphite reinforced PTFE double O-ring stem seal, and blowout proof stem. Provide EPDM or graphite reinforced PTFE ball O-rings. Actuator shall be factory or field

mounted, 24 VAC, direct connected to stem with single screw coupler and without the use of linkages. Torque requirements of actuator shall be selected to overcome the breakaway torque of the valve, and to open and close against the differential pressure at the hot water pumps. "Erie" type valves and solenoid valves shall not be allowed. Provide magnetic clutch for torque protection of the actuator and valve. Valve shall be capable of being manually opened to allow water flow if control circuit malfunctions, and to allow TAB work. Valves shall be manufactured by Siemens, Delta, Belimo, Johnson Controls or Warren.

- I. Hydronic Differential Pressure Switch: Differential pressure switch shall be used to sense differential pressure across hydronic devices, in order to verify flow or to prove pump status. Switch shall be snap acting SPDT with 10 million cycle mechanical contact life. System operating pressure shall be 0 to 150 psig and operate at specified temperature. Switch's setpoint shall be adjustable externally. Enclosure shall be NEMA 4.
- J. Hydronic Differential Pressure Transducer: Provide for measuring pressure differential across two locations in hydronic system. Transducer shall provide linear analog output proportional to pressure differential. Transducer shall be unidirectional type unless flow direction is designed for bidirectional flow. Maximum working pressure shall be 250 psig. Case shall be stainless steel/aluminum with NEMA 4/IP65 rating. Operating temperature range shall be 0°F to 175°F. Output shall be 0 to 10 VDC or 4 to 20 mA. Response time shall be 30 to 50 milliseconds.

## K. Air Differential Pressure Switch:

- 1. Provide electric controllers for binary (two-position) operation as specified in sequence of operation. Sensors integrity and accuracy shall not be affected by shock, vibration, and pressure surges of 150 percent of working pressure range or 25 psig above or below scale.
  - a. Electric Differential Pressure Switch: Provide Bourbon tube, bellows, or diaphragm type, with tamper proof adjustable set point and differential settings. Provide three valve manifolds for servicing. Provide filter bank switch with time delay to prevent false alarms due to pulsations. Provide switch rating as follows:
  - 1) Switch Pressure Range: Between 150 percent and 300 percent of the working differential pressure.
  - 2) Adjustable Switch-differential Range: As indicated.
- L. Current Monitoring Sensors/Switch: Current monitoring switches shall be utilized for monitoring motor operation. Switch shall be adjustable so that a contact closure is made any time the motor is operating within "normal" range (1.25 to 135 amps). Low motor amps resulting from low loading or belt failure shall indicate "OFF". Induced current from the motor power feed shall power current monitoring switch. The current monitoring switch shall provide visual indication (LED's) for output status and sensor power; shall have an adjustable trip set-point to +/-1% of its range from -15 to 60 degrees C; shall be isolated to 600 VAC rms; shall be a self gripping split-core type with an optional drill mount bracket. Output shall be N.O., Solid State, 1.0A at 30 VAC/DC with a minimum aperture of 0.52" x 0.68" for motor feed.

M. Flow Switch: Provide SPDT flow switch on system carrying water, glycol, etc. Flow switch shall have NEMA 3R enclosure, phosphor bronze bellows, stainless steel paddles, and gold plated contacts. Switch shall be designed for 160 psig, temperature range -20°F to 250°FF and NPT thread.

## N. Space Pressure Monitors:

- 1. Provide bidirectional bleed airflow sensors where indicated on the plans. These devices shall be used to verify negative space pressure relationships between the inside of the building and the outside, as well as pressure relationships between interior rooms. Basis of design is Ebtron Model GTx116B, or equal by Ruskin or Johnson.
- 2. Each measuring device shall consist of one to four sensor assemblies and a single, remotely mounted, microprocessor-based transmitter. Each sensor assembly shall contain three individually wired, hermetically sealed bead-inglass thermistors. Thermistors shall be mounted in the sensor assembly using a marine-grade, waterproof epoxy. Thermistor leads shall be protected and not exposed to the environment. The airflow rate of each sensor assembly shall be equally weighted and averaged by the transmitter prior to output. Each transmitter shall have a 16-character alpha-numeric display capable of displaying bidirectional airflow, bidirectional pressure, temperature, system status, configuration settings and diagnostics. Devices using epoxy-coated, chip-inglass or diode-case chip thermistors are not acceptable. Devices using less than three thermistors in each sensor assembly are not acceptable. Devices using stainless or platinum wire RTDs are not acceptable. Pressure sensors are unacceptable.
  - a. Provide hardware to install sensors between two adjacent pressure zones where indicated on the plans. Hardware shall include two 304 stainless steel face plates with protective stainless steel screens, connecting pipe and fittings. Provide correction coefficients to compensate for entry and friction loss of the entire assembly to convert the airflow rate to the equivalent pressure between adjacent zones. Provide a rain/snow shield for installations on exterior wall surfaces.

## 3. Sensor Assembly

- a. Each sensor assembly shall be manufactured of a U.L. Listed engineered thermoplastic.
- b. Each sensor assembly shall have an integral, U.L. Listed, plenum rated cable and terminal plug for connection to a remotely mounted transmitter. All terminal plug interconnecting pins shall be gold plated.
- c. The operating airflow range shall be  $\pm$  3,000 fpm unless otherwise indicated on the plans.
- d. Each measuring device shall be calibrated at a minimum of 10 airflow rates and have an accuracy of +/-2% of reading over the entire operating airflow range. Each sensor assembly shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
- e. Temperature accuracy shall be +/-0.14° F (0.08° C) over the entire operating temperature range of -20° F to 160° F (-28.9° C to 71° C).

- f. The operating humidity range for each sensor probe shall be 0-99% RH (non-condensing). Product design shall consider direct exposure to or immersion in liquid water and temporary exposure shall not damage the sensing elements.
- g. Each sensor assembly shall not require matching to the transmitter in the field.

## 4. Transmitters

- a. The transmitter shall have an integral LCD display capable of simultaneously displaying airflow and temperature. The LCD display shall be capable of displaying individual airflow and temperature readings of each independent sensor node.
- b. The transmitter shall be capable of field configuration and diagnostics using an on-board pushbutton interface and LCD display.
- c. The transmitter shall have an on-off power switch and operate on 24 VAC. Isolation transformers shall not be required.
- 1) The transmitter shall use a switching power supply, fused and protected from transients and power surges.
- 2) The transmitter shall use "watch-dog" circuitry to assure automatic reset after power disruption, transients and brown-outs.
- d. The operating temperature range for the transmitter shall be -20° F to 120° F (-28.9° C to 48.9° C). The transmitter shall be installed at a location that is protected from weather and water.
- e. The transmitter shall be capable of communicating with other devices using one of the following interface options:
- 1) Linear analog output signals for airflow and temperature: Field selectable, fuse protected and electrically isolated from all other circuitry, 0-5VDC / 0-10VDC / 4-20mA (4-wire)
- 2) RS-485: Field selectable BACnet-MS/TP, BACnet-ARCNET, Modbus-RTU or Johnson Controls N2-Bus.
  - a) BACnet devices shall provide analog variables for airflow and temperature containing individual sensor airflow rate and temperature data.
- 3) 10 Base-T Ethernet: Field selectable BACnet Ethernet, BACnet-IP, Modbus-TCP and TCP/IP
- 4) LonWorks Free Topology
- f. The transmitter shall be capable of providing an infra-red interface for manually downloading airflow and temperature data or for uploading transmitter configuration data using a handheld PDA (Palm or Microsoft Windows Mobile operating systems).
- 1) Provide PDA upload/download software for multiple users.
- 2) Provide a Microsoft Excel file capable of creating test and balance reports from PDA data files transferred to a Windows based PC.
- 3) Provide a Microsoft Excel file to create configuration data files that can be transferred from a Windows based PC to a PDA for upload to one or more transmitters.
- g. The transmitter shall be capable of identifying a 'damaged' sensor node, ignore it and continue to operate by correctly averaging the remaining sensor nodes.

- 5. The measuring device shall carry the CE Mark for European Union shipments, certifying compliance with all applicable compliance testing, regulations and EU directives.
- 6. The manufacturer's authorized representative shall review and approve placement and operating airflow rates for each measurement location indicated on the plans.
  - a. A written report shall be submitted to the consulting mechanical engineer if any measurement locations do not meet the manufacturer's placement requirements.
- O. Actuators: Damper and valve type actuators shall be the piston, electronic or DDC type, capable of controlling dampers and valves in response to a electric signal from a control device. Actuators shall be capable of being used for either modulating or two position action. Actuators shall be large enough to operate dampers and valves positively, efficiently and smoothly. Actuators which will lock in an intermediate position if the motor shaft is pushed or pulled (either manually or by air pressure acting or damper blades) shall not be acceptable. Actuators on outdoor air dampers shall be designed for spring return action. Actuators for fire/smoke dampers labeled "SD/FD" or smoke dampers labeled "SD" shall be electric (120 VAC powered open/spring closed) and provided integral with the damper.
- P. Low Limit Controllers (Freezestats): These shall be two wire, line voltage type used to detect low temperature conditions in an airstream which could potentially cause freeze-up conditions in cooling/heating coils or similar equipment. Control shall be of the limited filled type responsive only to the lowest temperature along the measuring element. The single pole, single throw electric contactors shall open below the controller's set point. A single scale shall show the "cutout" setting on the outside of the unit and set point shall be adjustable. Range shall be 35-45 degrees F. Sensing element shall be installed horizontally back and forth across the duct work and may be mounted in the inlet of the access section or coil section. Operation shall not be affected by ambient temperature changes at controller's case. The low limit switches shall be factory mounted to maximize coil coverage. Field installation will be acceptable if the proper capillary clips are used and all four corners of the coil and the coil face are uniformly protected. Averaging sensors must be installed with same quality procedures across the coil face.
- Automatic Control Dampers (Automatic Volume Dampers): Dampers shall be low O. leakage type. Automatic control dampers shall be of the modular type constructed of modular sections. Maximum size of any one section shall be 60" x 72". Frame shall be constructed of 16-gauge galvanized steel hat channel with tabbed corners. Blades shall be 14-gauge galvanized steel, roll formed, airfoil type. Blade edge seals shall be vinyl suitable for -76°F to 350°F range, mechanically locked into the blade edge. Adhesive or clip type seals are not allowed. Jamb seals shall be flexible metal compression type to prevent leakage between blade edge and damper frame. Blade end overlapping frame is not allowed. Shafts shall be 1/2" diameter, hex or square, cold-drawn machined steel, with drive shaft extendable to 5". Bearings shall be corrosion resistant, permanently lubricated, stainless steel sleeve type. Linkage shall be concealed out of air steam within the damper frame. Dampers under 12 inches in height shall be single blade type. Parallel blade dampers shall have linear characteristics and opposed blade dampers shall have equal percentage characteristics. Two-position dampers shall be parallel and modulating dampers shall be opposed. Provide submittal data showing leakage, maximum airflow, and maximum pressure ratings based on AMCA 500. Maximum system pressure of 48"

wide damper shall be 6.2 W.G. Maximum velocity of 48" wide damper shall be 4000 fpm. Units shall carry the AMCA seal for air leakage. At a pressure differential of 1" W.G., leakage through the closed damper shall not exceed 3 cfm per square foot for 48" wide dampers. Pressure drop through the open damper at an approach velocity of 1000 FPM shall not exceed 0.05" W.G. Close-off operating torque at a static differential of 4" W.G. shall not exceed 3.1 lb. in per sq. ft. of damper. Control damper shall be Ruskin Model CD-60, Greenheck Model VCD-33 or equal by Johnson.

- R. Airflow Measuring Stations: Provided by RTU Manufacturer.
- S. Duct Mounted Smoke Detector: Duct mounted smoke detectors shall be provided and installed herein and incorporated in the HVAC sequence of control under this section. The smoke detectors (in a duct mounted housing) shall be UL listed and conform to NFPA 72E, photo electric type with auxiliary DPDT relays contact, and duct sampling tubes extending full width of duct. Unit shall be designed for operation from 120 VAC power supply (Basis of design: Harrington Signal Model # D4120) or prior approved equal. Provide DPDT auxiliary contacts for HVAC system and remote alarm LED indicator. Provide low voltage wiring between remote alarm LED indicator and smoke detector. Remote alarm LED indicator shall be provided with integral 78 dB alarm horn, red alarm LED, green pilot light and key operated test/reset switch. (Basis of design: Harrington Signal Model #SSK451). Install remote alarm indicator in location indicated on plans. Duct mounted smoke detectors specified herein shall be provided and installed under this section, and incorporated in the HVAC sequence and shall be installed in the supply and return duct in the locations indicated on the plans. HVAC controls shall be wired through contacts in these smoke detectors to shutdown if smoke is detected.]
- T. Carbon Monoxide (CO) Detector: Provide carbon monoxide (CO) detector, located as shown on drawings. CO detector shall be commercial type, and shall be system connected with supervisory and trouble signal capability. Standalone CO detectors shall not be allowed. CO detector shall comply with UL 2075 (Gas and Vapor Detectors and Sensors) and shall be tested to UL 2034 (Standard for Single and Multiple Station Carbon Monoxide Alarms) for CO sensitivity levels. CO detector shall meet NFPA 720 for installation and maintenance. CO detector shall use electrochemical sensor technology. (Biomimetric or metal oxide semi conductor sensor technology is not allowed). Detector shall be provided with set of dry alarm contacts that will close when sensor senses alarm threshold CO concentration levels above that prescribed by UL 2075. Detector shall be permanently hard wired to accept either 120 or 24 or 12-volt power input. Contact closure shall send alarm signal to DDC system to alert of alarm condition. Detector shall be also be provided with a separate trouble/power supervision relay which shall send signal to DDC system if internal CO detector's microprocessor senses that detector is not working properly. Trouble/power supervision relay shall also send signal if microprocessor senses that detector is at the end of the unit's life, or experiences loss of power. Operating temperature shall be 40°F to 100°F, with 10 to 90% relative humidity (non-condensing). Detector shall be provided with integral alarm light and audible 85 dBA alarm, also. Provide warranty under the provisions of Division 23 - Closeout Document Requirements for HVAC. CO detector shall be manufactured by Edwards, GE, Intec, Macurco or prior approved equal.
- U. Boiler Supply Water Reset Controller: Provided internal to boiler by boiler manufacturer.
- V. Variable Frequency Drives (VFD): RTU supply fan VFD's provided by manufacturer.

## 2.4 DIRECT DIGITAL CONTROL (DDC) SYSTEM GENERAL PRODUCT DESCRIPTION

- A. General: The DDC system shall perform the sequence of operation specified herein. The DDC architecture shall consist of a main DDC panel, application specific controllers (ASCs), general purpose controllers, local area network (LAN) wiring, sensors and all other DDC components necessary for the sequence of control and as required by Owner.
  - 1. A distributed logic control system complete with all software and hardware functions shall be provided and installed. System shall be completely based on ANSI/ASHRAE Standard 135. This system is to control all mechanical equipment, including all unitary equipment such as VAV boxes, heat pumps, fancoils, AC units, etc. and all air handlers, boilers, chillers, and any other listed equipment. Proprietary equipment or systems shall not be acceptable and are specifically prohibited.
  - Software shall include password protection, scheduling (including optimum 2. start), alarming, logging of historical data, full graphics including animation, demand limiting, full suite of field engineering tools including graphical programming and applications. Systems using operating systems other than that described above are strictly prohibited. All software required to program application specific controllers and all field level devices and controllers will be left with the Owner. All software passwords required to program and make future changes to the system will also become the property of the Owner. All software required to make any program changes anywhere in the system, along with scheduling and trending applications, will be left with the Owner. All softwa re passwords required to make future changes to schedules, trends, and related program changes will also become the property of the owner. All software required for all field engineering tools, including graphical programming and applications will be left with the Owner. All software passwords required to program and make future changes to for all field engineering tools, including graphical programming and applications will be left with the Owner.
  - 3. Building controllers shall include complete energy management software, including scheduling building control strategies with optimum start and logging routines. All energy management software and firmware shall be resident in field hardware and shall not be dependent on the operator's terminal. Operator's terminal software is to be used for access to field-based energy management functions only. Provide zone-by-zone direct digital logic control of space temperature, scheduling, runtime accumulation, equipment alarm reporting, and override timers for after-hours usage.
  - 4. All application controllers for every terminal unit (including but not limited to VAV, HP, UV, etc.) air handler, all central plant equipment, and any other piece of controlled equipment shall be fully programmable. Application controllers shall be mounted next to controlled equipment and communicate with building controller thru LAN.

- B. Host Computer Software:
  - 1. Provide a complete graphics package which would allow an untrained operator to fully configure, change, program, adjust, etc., all control parameters by use of real time graphical representations of the entire HVAC/control system by means of a mouse with minimal (if any) keystrokes. When the user "clicks" through a series of ever increasingly detailed floor plans and graphical equipment/control representations, he will be able to obtain individual room/equipment graphics to change all setpoints, schedules, etc. Detailed graphics of the HVAC systems showing all control parameters shall be provided.
  - 2. <u>ALL</u> normal user programmable points shall be accessible through <u>graphical</u> interface. Owner shall have the ability to graphically view the status of the points (e.g., water temperatures, outdoor air temperature, supply temperature, setpoint, space temperature, etc.) and graphically change temperature setpoint. Owner shall have the ability to graphically view status of equipment points, and graphically change appropriate set points, schedules, etc., with a mouse by clicking on the icon on the monitor.
- C. Off-Site Interface: Control Contractor shall provide full control and monitoring of this building off-site.
- D. Wired Space Temperature Sensors: Low profile zone temperature sensor with button adjustment for +/-3°F off setpoint and push button override. Setpoint temperature and override time duration shall be adjustable from software at the main DDC panel or workstation. Mount on wall at 4' 6" above finished floor, unless noted otherwise.
- E. Humidity Sensors: Provided by controls contractor for control of equipment as shown on the drawings. Sensors shall be space mounted or duct mounted as shown on plans. Where connected to equipment, humidity sensors shall be compatible with the requirements of the manufacturer. Mount humidity sensors on wall at 4' 6" above finished floor unless noted otherwise.
- F. Web Based Access Requirements:
  - 1. Access to system by up to 5 concurrent authorized users from any computer with an Internet connection and a standard web browser (Google Chrome, Firefox, and Safari) installed.
  - 2. Full Graphical interface
  - 3. Ability to manage and restrict authorization levels of each user.
  - 4. The need for the FMS manufacturer to install any proprietary software is not acceptable. The system should be accessible from any computer connected to the owner's LAN system using a standard web browser.
  - 5. The Web based access should be integral to the control system the need to "bolt" on a separate piece of hardware to achieve this is not acceptable.
  - 6. Owner shall provide an incur any monthly charges of WAN/Internet connection.
  - 7. Coordinate with Owner/IT department to provide one or two Ethernet network connections. If two are required by Owner, one would be dedicated to BAS network and the second would provide physical connection to the Internet or IP based WAN. Separate network connections shall provide a physical barrier to prevent raw BAS traffic being exposed on the IP network.

## **PART 3 - EXECUTION**

## 3.1 EXAMINATION

- A. Verify that power supply is available to control devices and operator workstation.
- B. Verify that duct-, pipe-, and equipment-mounted devices are installed before proceeding with installation.

## 3.2 INSTALLATION

- A. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.
- B. Connect and configure equipment and software to achieve sequence of operation specified.
- C. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 54 inches above the floor, unless noted otherwise.
- D. Install guards on thermostats in the following locations:
  - 1. Entrances.
  - 2. Public areas.
  - 3. Where indicated on the drawings.
- E. Install automatic control dampers according to Division 23 Air Duct Accessories, and in accordance with manufacturer's installation instructions. Install square and free from racking, twisting or bending. After installation, contractor shall caulk between the damper and frame and duct to prevent leakage around perimeter of the damper.
- F. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.
- G. Install labels and nameplates to identify control components according to Division 23 Division 23 Identification for HVAC Piping and Equipment.
- H. Install hydronic instrument wells, valves, and other accessories according to Division 23 Hydronic Piping.
- I. Install an 11" x 17" set of control drawings in the main mechanical room in a hinged wall mounted cabinet. Each drawing shall be laminated, and drawings shall be bound together with a single metal ring. Provide bakelite label on cabinet cover engraved with "Control Drawings."

## 3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install all systems in accordance with manufacturer's installation instructions, NFPA-70 and NFPA-90A.

- B. Installation of Conduit and Wiring:
  - 1. All wiring and conduit installed under this section of the specifications shall be installed by a state-licensed contractor(s) and all work shall be done by state-certified technicians. All wiring systems shall be color coded and conductors shall be tagged at all junctions and terminals. Label cables identification numbers as directed by Owner. The Engineer and Owner reserves the right to move any device fifteen (15) feet without additional costs before the device is installed. All wiring and conduit shall be installed in accordance with Division 26 Electrical.
  - 2. All wiring shall be installed in conduit, except for plenum rated cable as specified below.
  - 3. All conduit shall be concealed, except in mechanical/electrical rooms.
  - 4. All control wiring above suspended ceiling, not made inaccessible by equipment, ductwork or structure, may be plenum rated cable with flame spread of 25 or less and smoke development of 50 or less as tested by ASTM-E84. This plenum rated cable is not required to be installed in conduit, but shall be run in a workmanlike manner, parallel to the building lines, properly supported at regular intervals, and not draped over conduit, piping and ductwork. Attach cable above ceiling to structure using appropriate fasteners for type of construction involved. Cable shall not lay atop ceiling. Where physical damage is possible, mechanical protection shall be used. All splices or connections shall be made at equipment served. Where communication loops are run, terminations shall be at terminal strip on equipment. No splices in field shall be allowed. The use of snap in bushings or connectors is required where cable is entering a knockout or equipment housing. All penetrations through wall sleeves shall be sleeved with conduit with bushings on both ends.
  - 5. Contractor shall provide a conduit location plan and submit to the Architect for review prior to installing conduit and control devices. Conform to requirements of Architect concerning patching of existing walls. Cutting of molding, crown molding, base molding, etc., and any other items determined by the Architect shall be prohibited.
  - This project consists almost exclusively of existing construction work. Almost 6. all existing walls are of concrete masonry construction which are from floor to bottom of roof deck, and many areas in concrete masonry are reinforced with vertical and horizontal rebar and concrete. Therefore, the contractor shall route all temperature sensor/thermostat wiring from above ceiling to temperature sensors/thermostats in existing conduit or surface metal raceway. Coordinate all surface metal raceway routing for control wiring with Division 16 for electrical surface metal raceway systems. Surface metal raceway shall be routed as directly to temperature sensors/thermostats as possible. Coordinate surface metal raceway routing with existing conditions, and with all new marker boards, tack boards, etc. Wiring for temperature sensors/thermostats shall be in dedicated surface metal raceway, and shall not be inside surface raceway with any Division 16 wiring. Contractor shall contact Architect and Owner for review of a typical classroom's surface metal raceway and temperature sensor installation prior to installing remaining devices in other classrooms.

# 3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, commission and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

#### 3.5 ADJUSTING

- A. Calibrating and Adjusting:
  - 1. Calibrate instruments.
  - 2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
  - 3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
  - 4. Control System Inputs and Outputs:
    - a. Check analog inputs at 0, 50, and 100 percent of span.
    - b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
    - c. Check digital inputs using jumper wire.
    - d. Check digital outputs using ohmmeter to test for contact making or breaking.
    - e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.

## 5. Flow:

- a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
- b. Manually operate flow switches to verify that they make or break contact.

#### 6. Pressure:

- a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
- b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.

## 7. Temperature:

- a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
- b. Calibrate temperature switches to make or break contacts.
- 8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
- 9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
- 10. Provide diagnostic and test instruments for calibration and adjustment of system.
- 11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

- B. Adjust initial temperature and humidity set points.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions.

## 3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to Division 1 -Demonstration and Training.
- B. Provide certificate stating control system has been tested and adjusted for proper operation.
- C. Provide a complete operational temperature control and BAS based on the sequence of operation as specified. If additional points are required to meet the sequence of operation, they shall be provided.

## 3.7 TRAINING

- A. Provide training of Owner's personnel in accordance with provisions of Division 23 Closeout Document Requirements for HVAC.
- B. Training Course Content: For guidance in planning the required instruction, the contractor shall assume that attendees will have a high school education or equivalent, and are familiar with HVAC systems. The training course shall cover all of the material contained in the Operating and Maintenance Instructions, the layout and location of each HVAC control panel, the layout of one of each type of unitary equipment and the locations of each, the location of each control device external to the panels, preventive maintenance, troubleshooting, diagnostics, calibration, adjustment, commissioning, tuning and repair procedures. Typical systems and similar systems may be treated as a group, with instruction on the physical layout of one such system. The results of the performance verification test and the calibration, adjustment and commissioning report shall be presented as benchmarks of HVAC control system performance by which to measure operation and maintenance effectiveness.
- C. Provide application engineer to instruct owner in operation of systems and equipment.
- D. Provide system operator's training to include (but not limited to) such items as the following: modification of data displays, alarm and status descriptors, requesting data, execution of commands and request of logs. Provide this training to a minimum of 3 persons.
- E. Provide on-site training above as required, up to 16 hours as part of this contract.
- F. Provide tuition for at least one individual for a one-week factory training class. If applicable, costs for travel, lodging and meals will be the responsibility of the Owner.

## 3.8 ALARMS

A. All alarms specified herein shall send a signal to the host computer(s) and offsite interface to notify the Owner of an alarm condition.

## 3.9 DDC CONTROLLER LOCATIONS (other than factory mounted controllers):

A. Controls contractor shall mount DDC controllers in a location acceptable to the Owner. Controllers for rooftop equipment shall not be above high ceilings (12 feet or higher ceiling), and shall not be mounted at the equipment or above the roof line. Some specific controller locations may be indicated on the drawings. Controllers for rooftop equipment shall be installed in mechanical rooms to allow easy access, and shall not be installed elsewhere. If a location is not specifically shown for a piece of rooftop equipment, or if the location is not identified in this paragraph, controller may be installed above ceilings lower than 12 feet, but shall be accessible. Controllers for vertical water source heat pumps, vertical fan coil units, shall be mounted on wall adjacent to unit, unless indicated otherwise.

## 3.10 VAV/FAN POWERED BOX DDC CONTROLLERS AND ACTUATORS

A. The controls contractor shall ship their DDC controllers and actuators for each VAV/fan powered box to the VAV/fan powered box manufacturer, and shall coordinate with the VAV/fan powered box manufacturer so that these controllers and actuators are factory installed and factory wired prior to shipment to the job site. Controls contractor shall provide VA data for actuator, controller and hot water valve to allow the VAV/fan powered box manufacturer to properly size control transformer for these devices. Transformer for VAV/fan powered box is provided by VAV/fan powered box manufacturer.

## 3.11 BOILER RESET CONTROLLERS

A. Install in accordance with manufacturer's installation requirements. On fin tube type boilers, to prevent flue gas condensation, entering water temperature shall not be allowed to fall below manufacturer's minimum inlet water temperature and minimum supply temperature shall be adjusted accordingly to allow minimum entering temperature to be above manufacturer's minimum requirements. Reset controllers shall be integral to equipment or provided by boiler manufacturer.

## 3.12 LINE VOLTAGE CONTACTOR LOCATIONS

A. Controls contractor shall mount line voltage contactors serving exhaust fans (and other devices) in mechanical corridors, mechanical closets, electrical rooms, janitor's closets, and similar locations as indicated on the drawings. If no specific contactor location is indicated on the drawings, contractor may mount contactor above ceilings, provided that the ceiling is 12 feet or lower and provided that contactor is accessible and near the piece of equipment served.

#### 3.13 CARBON MONOXIDE DETECTORS

- A. Installation: Carbon monoxide detectors shall be installed in accordance with the manufacturer's installation instructions and NFPA 720 (Standard for Installation of Carbon Monoxide (CO) Detection and Warning Equipment). Provide bakelite label at all entrances into space containing CO detector engraved "CARBON MONOXIDE DETECTOR IN USE AND LOCATED INSIDE THIS SPACE." Provide remote alarm located at the primary entrance to space containing CO detector.
- B. Training: Provide four (4) hours of training by contractor to Owner's designated personnel on operation and maintenance of CO detectors.

# 3.14 SEQUENCE OF OPERATION

- A. Overall Building Control Description:
  - 1. Time Clock Program: Owner shall provide Contractor with the required start/stop times for each piece of equipment so the Contractor can program the individual start/stop time for each piece of equipment. Equipment which shall be start/stopped by the time clock program is indicated in later paragraphs. All other equipment not started by the time clock program will be started and stopped as described in later paragraphs of this section of specifications.
  - 2. Override Timer Programs: Override timer programs shall override the time clock program during its "OFF" cycles to re-start the equipment in its normal operating mode. Room temperature sensors shall be provided with integral pushbutton override to restart equipment in normal operating mode for a preprogrammed (one hour, adjustable) duration.
  - 3. Night Setback Programs: Night setback/setup temperature programs shall override the time clock program during its "off" cycles, when the space temperature drops/rises below or above setpoint (55°F/85°F, adjustable) to restart the respective equipment to satisfy the room temperature night setback/setup setpoint (as sensed by the respective room temperature sensor.) Anytime night setback/setup program is activated, all exhaust fans shall remain off, outdoor air dampers shall remain shut.
  - 4. Morning Warm Up and Cool Down Programs: During morning hours, prior to building occupancy, equipment as specified in later paragraphs shall operate until space temperature sensors reach 75°F (adjustable). Control system shall "learn" the time required to perform this function and shall adjust the start time to bring the equipment on at the appropriate time (optimum start). During morning warm up/cool down, equipment as specified in later paragraphs to remain off shall not operate.
  - 5. Fire Safety Controls: All supply air systems above 2000 cfm shall be provided with a supply duct mounted smoke detector and systems over 15,000 cfm shall be provided with a supply and return mounted duct smoke detector, furnished under Division 26. Certain pieces of equipment may be identified on the drawings as being provided with factory installed smoke detectors. Certain pieces of equipment as indicated in later paragraphs shall also be subject to an emergency shutdown function which shall be activated by closure of the HVAC shutdown relay by a signal from the main fire alarm panel.

- 6. Emergency Shutdown Controls: All RTU units shall be subject to an emergency shutdown function which shall be activated by closure of the HVAC shutdown relay in the main fire alarm panel. This equipment shall also be shut down upon a phase loss condition as specified.
- 7. Power Outage Recovery Control: In the event of a power outage, the control system shall be restored to its last state (prior to power outage) as quickly as possible after power has been restored. Setpoints shall not be lost during power outages.
- 8. All existing control and monitoring functions shall be maintained for existing to remain HVAC equipment.
- B. Sequence of Operation for Variable Air Volume DX Rooftop Air Conditioners with Gas Heat:
  - 1. Factory Controls: The unit shall operate with packaged pre-programmed factory controls. The control contractor shall "read" and "write" from/to the unit via Bacnet Communication.
  - 2. Unit functions will be enabled for operation by the control system's time clock program, override timer program, night setback/setup program or morning warm up/cool down program.
  - 3. Supply Fan Control: The supply fan shall run continuously when the control system's time clock program is in the occupied mode, override timer program is enabled, night setback/setup program is enabled or morning warm up/cool down program is enabled. Supply fan cycles as required during unoccupied periods. The supply fan(s) shall increase/decrease it's speed in response to the duct differential pressure (DP) setpoint as sensed by the DP transmitter installed in the main supply duct approximately 2/3 downstream of the unit.
  - 4. Cooling Control: The unit shall stage the cooling circuits to maintain the supply air temperature at the supply air temperature setpoint.
  - 5. Safety Shutdown Control: The units shall be subject to shut down by the following:
    - a. Internal safeties
    - b. Duct mounted smoke detector on units over 2, 000 cfm.
    - c. HVAC shutdown relay activated by building fire alarm panel
    - d. Phase loss/reversal three phase only.
  - 6. Gas Heating System Control: The gas heating system shall modulate to satisfy the supply air temperature setpoint.
  - 7. Economizer Control: The economizer and relief fan(s) shall be enabled only when the outside air is ≤ 50°F. The unit shall operate based on its factory controls to modulate the outside air damper and return air damper to satisfy supply air temperature setpoint. The relief fans shall operate to satisfy the space static pressure setpoint (adjustable).
  - 8. Supply Air Temperature Reset: The supply air temperature setpoint shall be reset based on outside air temperature. The reset strategy shall be easily adjustable by the Owner from the DDC graphics page. The initial reset strategy shall be as follows:
    - a. When outside air temperature (OAT) is  $\geq 50^{\circ}$ F (adjustable) the supply air temperature setpoint shall be  $54^{\circ}$ F.
    - b. When the OAT is  $\leq 20^{\circ}$ F the supply air setpoint shall be 65°F.

- 9. Freezestat Protection Mode: In the event the supply air temperature drops to ≤ 35°F (adjustable) as sensed by the factory mounted supply air temperature sensor, the Building Automation System (BAS) shall command the RTU off on a low limit condition. An "Low Limit" alarm shall be sent to the Operators work station.
- C. Sequence of Operation for Exhaust and/or Supply Fans:
  - 1. SF-1 shall be interlocked with existing exhaust fan (EF-1) on mechanical room roof. Both fans shall be interlocked with the emergency generator to operate when the generator operates.
- D. Sequence of Operation for Existing Hot Water Baseboard Heaters and Hot Water Ceiling Heaters:
  - 1. The existing hot water baseboard and ceiling heaters are divided into two zones, an "east" zone, and a "west" zone. Each zone shall be controlled independently via a three-way control valve for each of the two zones. Each valve's position shall be modulated proportionately from fully open to the coil to fully closed to the coil based on outdoor air temperature. All setpoints shall be easily adjustable in the controls by the Owner. Initial setpoints shall be set by the controls contractor as follows:
    - a. When outside air temperature is  $\leq 15^{\circ}F$  (adjustable) the control valves shall be fully open to the coil (closed to the bypass)
    - b. When the outside air temperature is  $\geq 50^{\circ}F$  (adjustable) the control valve shall be fully closed to the coil (open to the bypass)
    - c. Full modulation of the control valves shall be proportional between the two setpoints. Contractor shall ensure good control valve authority when selecting valve to ensure acceptable proportional control.
- E. Sequence of Operation for VAV Box with Hot Water Coil(s):
  - 1. The control system shall maintain zone temperature setpoints by controlling the VAV air damper and zone heating valve(s) via the following:
    - a. When zone temperature is greater than its cooling setpoint, the VAV air damper shall modulate between the minimum scheduled airflow (adjustable) and the maximum scheduled cooling airflow (adjustable) until the zone temperature is satisfied. Hot water valve shall be closed.
    - b. When the zone temperature is between the cooling setpoint and the heating setpoint (dead band), the zone damper shall control to its minimum scheduled airflow (adjustable). Hot water valve shall be closed.
  - 2. When zone temperature is less than its heating setpoint, the controller shall enable and modulate heating valve and the VAV damper shall move to scheduled heating airflow (adjustable) position. Discharge air temperature sensor shall limit LAT to 110°F (adjustable).
  - 3. When the zone Relative Humidity (%RH) is greater than the %RH setpoint (60% adjustable) the terminal unit damper shall modulate to deliver max cooling airflow, and the hot water three-way control valve shall modulate to maintain the space temperature to the cooling setpoint to eliminate overcooling of the space. This mode shall be called dehumidification mode. When a zone is in dehumidification mode, the DDC graphic for the terminal unit serving the zone shall display "Dehumidification Mode".

- F. Sequence of Operation for Parallel Fan Powered Terminal Box with Hot Water Coil:
  - 1. When zone temperature is greater than the cooling setpoint, the variable air volume (VAV) damper shall modulate between the minimum scheduled cooling airflow (adjustable) and the maximum scheduled cooling airflow until the zone temperature is satisfied. Hot water valve shall be closed. As temperature falls VAV damper modulates to minimum position.
  - 2. After VAV damper reaches minimum position, the space temperature shall drift in a dead-band until reaching the heating control setpoint. As zone temperature continues to fall below heating setpoint, fan shall be energized. If zone temperature continues to fall heating valve shall modulate open. Discharge air temperature sensor shall limit LAT to 110°F (adjustable).
  - 3. When the zone Relative Humidity (%RH) is greater than the %RH setpoint (60% adjustable) the terminal unit damper shall modulate to deliver max cooling airflow, and the hot water three-way control valve shall modulate to maintain the space temperature to the cooling setpoint to eliminate overcooling of the space. This mode shall be called dehumidification mode. When a zone is in dehumidification mode, the DDC graphic for the terminal unit serving the zone shall display "Dehumidification Mode".
  - 4. In Dehumidification Mode, the fan shall <u>not</u> be energized for reheat.
- G. Sequence of Operation for Hot Water Plant with Condensing Boiler:
  - 1. General: Hot water will be required whenever there is a call for heating or dehumidification. A call for heating shall be defined as: anytime a hot water valve is greater the 0% open to the coil. A call for dehumidification shall be defined as anytime a zone RH sensor is reading zone RH greater than zone RH setpoint. There shall be a minimum runtime for the hot water plant of 4 hours (adjustable).
  - 2. Hot Water Pump Start/Stop: The hot water pump shall run whenever hot water is required as stated above. The control system shall alternate from lead to lag pump every seven (7) days to equalize pump wear. The control system shall switch to automatic back-up in the event of lead hot water pump failure. Automatic back-up pump shall be started in the event that lead pump flow is not proven within 15 seconds of start signal by current transducer switch and auxiliary starter contact. An alarm shall be sent to Owner's on site (if specified) and off site host computer advising of pump failure.
  - 3. Boiler Start/Stop: When hot water is required as indicated in above paragraph, boiler's internal controls shall modulate its power burner to maintain 180°F (adjustable) leaving water temperature, subject to its factory installed safety and operating controls. Boiler shall be provided with a temperature reset controller to automatically change the leaving water temperature based on outside air temperature. The boiler leaving water temperature controls shall be easily adjustable by the Owner from the DDC controls boiler graphics page.
  - 4. Boiler Safety Shutdown Controls: The boiler shall be subject to shut down by the following:
    - a. Internal safety controls including probe and float type low water cut off and high temperature limit cut off.
    - b. Boiler emergency shutdown switch(es) as shown on the drawings.
    - c. Signal from DDC system during a CO monitor "alarm" condition.

- H. Additional System Monitoring and Control Functions:
  - 1. General: In addition to the equipment previously specified to be controlled by the control system, the following additional items shall be monitored and/or controlled by the control system. All points shall be available for display from the operator interface. All alarms shall be sent to the Owner's on site (if specified herein) and remote off site central computer.
  - 2. Phase Monitoring: DDC system shall monitor a binary phase loss input signal from the switchgear. Phase monitoring equipment shall be provided by Division 26, Electrical. Phase monitoring control sequence shall be used by controls contractor to shut down all three phase HVAC equipment as specified herein. DDC system shall maintain a log of each occurrence including date, time and duration of occurrence.
  - 3. Carbon monoxide (CO) Detector Monitoring: DDC system shall monitor two binary inputs from each CO detector. The first input is an alarm when CO level rises above concentration level set by Owner. The second input is a trouble alert when CO detector's internal controls senses a malfunction, or that CO detector is at the end of its life, or if power is lost. DDC system shall send alarm to Owner if either input occurs.

END OF SECTION

#### **SECTION 23 21 13**

## HYDRONIC PIPING

#### 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 pipe and fitting materials, joining methods and piping specialties as described below:
  - 1. Hot-water heating piping.
  - 2. Makeup-water piping.
  - 3. Air conditioning condensate-drain piping.
  - 4. Automatic air-vent piping.
  - 5. Pressure relief valve-inlet and -outlet piping.
  - 6. Automatic air vents
  - 7. High capacity automatic air vents
  - 8. Diaphragm type expansion tank
  - 9. Tangential type air separators
  - 10. Strainers
  - 11. Pressure compensating flow control valves
  - 12. Backflow preventers
  - 13. Water Pressure Reducing Valves
  - 14. Pressure relief valves
  - 15. Manual air vents

## 1.3 SUBMITTALS

- A. Product data for each of the following shall be submitted under provisions of Division 23 Common Requirements for HVAC Equipment.
  - 1. Hydronic piping material.
  - 2. Air control devices.
  - 3. Hydronic specialties.
- B. Operation and Maintenance Data for Air Control Devices and Hydronic Specialties: Submit operation and maintenance data under provisions of Division 23 Closeout Document Requirements for HVAC.

## 1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

- B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  - 2. Contractor shall certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
  - 3. Conform to applicable state labor regulations.
- C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. All grooved joint couplings, fittings, valves and specialties shall be the product of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooving components.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 23 Common Requirements for HVAC Equipment.
- B. Store and protect products under provisions of Division 23 Common Requirements for HVAC Equipment.

## PART 2 - PRODUCTS

- 2.1 HOT WATER HEATING PIPING ABOVE GRADE (INCLUDING PIPE RUNOUTS TO TERMINAL UNITS)
  - A. Copper Tubing: ASTM B88 type 'L' hard drawn. Fitting: ANSI/ASME B16.9 pressure pattern wrought copper. Joints: ANSI/ASTM B32 Lead free solder or silver braze as specified herein. Pro Press fitting shall also be acceptable.

# 2.2 MAKE UP WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88 type 'L' hard drawn. Fitting: ANSI/ASME B16.9 pressure pattern wrought copper. Joints: ANSI/ASTM B32 Lead free solder or silver braze as specified herein. Pro Press fitting shall also be acceptable.

## 2.3 RELIEF VALVE DISCHARGE AND DRAIN PIPING

A. Utilize same piping material as specified for the medium being discharged.

## 2.4 UNIONS, COUPLINGS AND JOINTS

- A. Dielectric Connections:
  - 1. Description: Combination fitting of copper-alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

- 2. Dielectric Unions: Factory-fabricated union assembly, for 250-psig minimum working pressure at 180 deg F.
- 3. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150-or 300-psig minimum working pressure as required to suit system pressures.
- 4. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
  - a. Separate companion flanges and steel bolts and nuts shall have 150or 300-psig minimum working pressure where required to suit system pressures.
- 5. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- 6. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
- B. Unions: For pipe sizes 2 inches and under, unions shall be 150 psig bronze with soldered joints for copper piping.

## 2.5 FLANGES FOR COPPER TUBING

A. Raised face 150 lb. brass flanges with carbon steel bolts full size of bolt holes and hex nuts with washers. Install flanges in horizontal lines with bolt holes straddling vertical and horizontal pipe center lines. Install flanges in vertical lines with bolt holes straddling lines parallel to equipment center lines and building lines. Gaskets shall be 1/16" gray-black ring type compressed non-asbestos, ANSI B16.21. Utilize dielectric flange kits when connection to ferrous components.

#### 2.6 SOLDER

A. Solder shall be lead free having composition of minimum 94% tin, 4% to 5% copper and 0.4% to 0.2% silver or selenium. Solder shall have a minimum tensile strength of 6,900 psi at 70°F, melting temperature of between 410°F and 440°F maximum to protect valve seat material. Solder shall conform to ASTM B-32 and shall be applied in conformance with ASTM B-828. Flux shall conform to ASTM B-813. Solder shall be manufactured for the HVAC industry not circuit board industry. Solder shall be Taramet Sterling Lead Free as manufactured by Taracorp, Dutch Boy Silver as manufactured by Taracorp or Lenox Sterling Lead Free.

# 2.7 AIR CONDITIONING CONDENSATE DRAIN PIPING

A. Copper Tubing: ASTM B88 type "L" hard drawn copper tubing. Fittings: Sweat type, wrought copper. Joints: Lead free solder as specified herein.

#### 2.8 AIR CONTROL DEVICES

A. Automatic Air Vents: Bronze or cast-iron body with all brass internal part construction with ball check to prevent air re-entry. Suitable for pressures to 75 psig and temperatures to 240 degrees F. Provide 1/4" NPS discharge connection.

Hoffman: No. 79
 American Tube: 706
 Armstrong: 1-AV
 Metraflex: Metravent
 Flow Design: No. 1/4AA

6. Maid-O-Mist

B. "High Capacity" Automatic Air Vents: Cast iron or brass construction with stainless steel, brass, EPDM and silicone rubber internal components. Provide float action pilot operation for instant venting of air. Suitable for pressures to 150 psig and temperatures to 250 degrees F. High capacity type automatic air vents must have a published air removal capacity of 10 scfm at 15 psig. Provide 1/8" tapping for drain connector.

1. Bell & Gossett: No. 107

Amtrol: 720
 Taco: 409

4. Wheatley: AR050

5. John Wood: JHAV-63-075

- C. Bladder-Type Expansion Tanks: Vertical or horizontal (as indicated) partial acceptance bladder type tank with steel shell designed and constructed in accordance with ASME Section VIII, Division 1. Bladder shall be fabricated from heavy duty butyl rubber and shall separate air charge from system water to maintain required expansion capacity. Bladder shall be removable for inspection. Tank shall be ASME stamped for working pressure of 125 psig with the ASME "U" symbol stamped on the expansion tank or nameplate and maximum operating temperature of 240°F. Provide schraeder valve for charging purposes. Expansion tanks shall be manufactured by Taco, Armstrong, Amtrol, Thrush, Wood, Wheatley or Bell and Gossett.
- D. Tangential-Type Air Separators: Non-tangential, in-line deceleration type air separators are not allowed. Units shall have air collector vent connection on top to direct released air into the high capacity automatic air vent. A blow-down connection shall be provided for routine cleaning. Units shall be constructed in accordance with ASME and stamped for 125 lb. working pressure with the ASME "U" symbol stamped on the air separator or nameplate. Air separators shall be manufactured by Bell and Gossett, Taco, Amtrol, Thrush, John Wood, Wheatley or Armstrong.
- E. Manual Air Vents: Brass body, "Coin-operated" style, Knurled slotted handle, blowout proof needle style valve, side vent, 1/8" to 1/4" NPT. Provide extended neck on insulated piping. Vent shall be rated minimum 150 psig at 250°F. Bell and Gossett Model 4V, Flow Design Model AV, or Griswold Model 738-01.

## 2.9 HYDRONIC PIPING SPECIALTIES

#### A. Strainers:

- 1. Y-Type, 2-1/2" and Smaller:
  - a. Threaded or soldered connections, cast bronze, 200 psi WOG at 150°F. Basis of design is Watts 777.
  - b. At VAV boxes, contractor has the option of using a combination Y-strainer and ball valve. Provide threaded or soldered connections, forged brass, 400 psig at 250°F. Ball valve shall have Teflon packing, brass packing nut and stem, full size steel handle with vinyl grip, and union connection on discharge.
- 2. Strainer Screens: On strainers serving devices with 1.5 gpm or less, provide 40 mesh wire screen strainer. On all strainers greater than 1.5 gpm, provide a 20-mesh wire start-up screen liner. On strainers 2" to 5", provide 1/16" perforated screen. All screens shall be type 304 stainless steel.
- 3. Contractor shall remove start-up strainer liner after approximately 60 hours operating time, unless a different time is specified in "Pipe Flushing and Cleaning" paragraph. Install strainers with chamber facing down to prevent air binding of the housing. Install strainer so cover and screen are easily removable. Provide full size blow down ball valve with hose connection and cap on strainers 2-1/2" and larger. Blow down opening on cover shall be on bottom of cover.
- 4. Strainers shall be manufactured by Griswold, Anvil, Mueller, Hoffman, Metraflex, Keckley, Flow Design, Hydronic Components, Inc. (HCI), Victaulic or Wheatley equal to the basis of design Watts model specified herein. Strainers may not be field fabricated. Combination Y-strainer and ball valves shall be manufactured by Flow Design, Pro Hydronics, Nexus, Bell and Gossett, Griswold or Parts Service Inc.
- B. Manual Balancing Valves (Circuit Setters): Manual balancing valves, (circuit setters) shall be sized for the rated flow and shall be manufactured by Griswold, Nexus, Tour & Anderson with bypass arrangement, Victaulic, Parts Service, Inc., Pro Hydronics, Hydronic Components, Inc. (HCI), Bell & Gossett, Hays or Flow Design. See Division 23 Closeout Document Requirements for HVAC for warranty information.

## 2.10 BACKFLOW PREVENTER

A. Reduced pressure zone principle: bronze body, ball valve test cocks, replaceable seats, with strainer, quarter-turn valves and manufacturer furnished air gap fitting. Watts series 909-S-QT or equal by Zurn or Wilkins.

## 2.11 WATER PRESSURE REDUCING VALVES

- A. Bronze body, nickel alloy seat, high temperature resisting diaphragm with stainless steel perforated strainer screen and built-in bypass check valve feature to relieve thermal expansion pressure. Adjusting screw and cage screws shall be corrosion resistant.
- B. Provide pressure gauge on both sides of valve.

- C. For locations or equipment having pressure requirements of 25-75 psi provide Watts 223SB with number 146 spring.
- D. For make-up water station and any other equipment having a pressure requirement for 10-35 psi, provide Watts 223SBLP with number 69 spring.
- E. Equals by TACO, B & G, Wilkins or CASE-ACME with appropriate springs are acceptable.

## 2.12 PRESSURE RELIEF VALVES

- A. Bronze or brass body for protection of pressure, with pressure setting as indicated on drawings. Maximum temperature of 250°F. Pressure relief valve shall be ASME Section IV certified.
- B. Manufacturer: Watts Model 174A, Model 790 or 1170 by Bell & Gossett or equal by Zurn.

## **PART 3 - EXECUTION**

## 3.1 PIPING INSTALLATIONS

- A. Drawings show the general arrangement, layout and location, of piping, appurtenances, etc., but do not show all required fittings and offsets that may be necessary to connect piping to equipment, etc., offset around obstructions, and to coordinate with other trades. Fabricate and install piping, appurtenances, etc., based on field measurements. Provide all necessary fittings and offsets at no additional cost to the Owner. Coordinate with other trades, existing building conditions, etc., for space available and relative location of piping, appurtenances, etc. Pipe, appurtenances, etc., locations shown on drawings shall be altered by Contractor where required to avoid interference and clearance difficulties.
- B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise. Route piping in an orderly manner.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel and lay in light fixture removal. Install piping to conserve space and not interfere with use of space.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.

- J. Select system components with pressure rating equal to or greater than system operating pressure.
- K. Install groups of pipes parallel to each other at common elevations, spaced to permit applying insulation and servicing of valves. Maintain four-inch minimum clearance between parallel runs of piping after insulating, space permitting.
- L. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- M. Establish inverts and install piping at a uniform grade of 0.2 percent upward in direction of flow for non-gravity systems.
- N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
- P. Install valves according to Division 23 General-Duty Valves for HVAC Piping.
- Q. Install unions or grooved joint couplings in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- R. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.
- S. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blow off connection for strainers smaller than NPS 2.
- T. Identify piping as specified in Division 23 Identification for HVAC Piping and Equipment.
- U. Provide chrome plated escutcheon plates for all piping penetrations through walls exposed to view.
- V. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- W. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- X. Mitered Fittings and Tapped Pipes: Mitered fittings and tapped pipes are not allowed. All changes in direction and pipe branches shall be accomplished by the use of fittings.
- Y. Where flanged connections are provided to connect butterfly valves to other flanged piping components, the contractor shall provide spool pieces as necessary to allow the disc to extend to the fully open position.

## 3.2 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor devices are specified in Division 23 Hangers and Supports for HVAC Piping and Equipment. Comply with the following requirements for maximum spacing of supports.
- B. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
  - 1. NPS 1/2 and NPS 3/4: Maximum span, 6 feet; minimum rod size, 3/8inch.
  - 2. NPS 1 and NPS 1-1/4: Maximum span, 6 feet; minimum rod size, 3/8 inch.
  - 3. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - 4. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - 5. NPS 2-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.
- C. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
  - 1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 3/8 inch.
  - 2. NPS 1: Maximum span, 6 feet; minimum rod size, 3/8 inch.
  - 3. NPS 1-1/4: Maximum span, 6 feet; minimum rod size, 3/8 inch.
  - 4. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - 5. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
- Plastic Piping Hanger Spacing: Space hangers according to pipe manufacturer's written instructions for service conditions and also maximum span of five feet.
   Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.
- E. Install a hanger within 12-inches of each horizontal elbow.

### 3.3 PIPE JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems. Joints shall be determined by the equipment connections or by the valve or fitting specified herein.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

- 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- 3. Use threaded pipe only in accessible locations.
- F. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- H. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. PVC Nonpressure Piping: Join according to ASTM D 2855.

#### 3.4 HYDRONIC SPECIALTIES INSTALLATION

- A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.
- B. Install automatic air vents at <u>all</u> high points of system piping and elsewhere as required for air venting and as shown on the drawings.
- C. Install tangential air separator upstream of pump suction. Install blow down piping with full-port ball valve; extend full size to nearest floor drain or cap as shown on drawings.
- D. Vent and purge air from hydronic system and ensure expansion tank is properly charged with air to suit system Project requirements.

## 3.5 TERMINAL EQUIPMENT CONNECTIONS

- A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.
- B. Install ports for pressure gages and thermometers at coil inlet and outlet connections according to Division 23 Meters and Gages for HVAC Piping.

# 3.6 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
  - 1. Leave joints, including welds, uninsulated and exposed for examination during test.
  - 2. Coordinate pressure tests of piping with phasing as described in phasing plan.
  - 3. Flush hydronic piping systems as described in paragraph "Pipe Flushing and Cleaning".

- 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
- 5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on hydronic piping:
  - 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing.
  - 2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
  - 3. Isolate expansion tanks and determine that hydronic system is full of water.
  - 4. Subject piping system to hydrostatic test pressure of 150 psig. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
  - 5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks. Test pressure shall be maintained for four hours. There shall be no drop in pressure during the test. All copper pipes shall have the joints struck during the test.
  - 6. Piping systems shall be subjected to constant inspection and final approval of the Owner, Engineer and Code Authorities having jurisdiction. Contact Engineer and all code authorities 48 hours before making any pressure tests. Tests, in addition to those included in this section required to show compliance, shall be performed as directed at no additional cost.
  - 7. Prepare written report of testing.
- C. Contractor shall, at the completion of the project, bleed all air out of the piping system using manual and automatic air vents. This shall occur, at a minimum, at all locations where air is suspected to have accumulated, at all high spots, and where specifically shown.
- D. Perform the following before operating the system:
  - 1. Open manual valves fully.
  - 2. Inspect pumps for proper rotation.
  - 3. Set makeup pressure-reducing valves for required system pressure.
  - 4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
  - 5. Set temperature controls so all coils are calling for full flow.
  - 6. Inspect and set operating temperatures of hydronic equipment, such as boilers, to specified values.
  - 7. Verify lubrication of motors and bearings.
- E. Training: For grooved piping, a factory trained representative (direct employee) shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove and product installation.

F. Application: For grooved piping, a factory authorized representative shall periodically visit the job site and review installation. Contractor shall remove and replace any improperly installed products.

## 3.7 WATER SYSTEM START-UP AND TREATMENT

A. After pressure testing piping and correction for any piping leaks, the piping system shall be thoroughly flushed of all foreign matter and debris as described in this paragraph. The three-way valves at each terminal unit coil shall be positioned to the fully bypassed position so that no water is flowing through the coil at each piece of equipment. For terminal units with two-way control valves, the supply and return connections shall be disconnected and looped together with a braided hose to flush the branch without allowing any water to pass through the coil. The entire piping system shall be filled with fresh water and the system pumps shall be started to circulate the water. The system strainers shall be checked frequently and cleaned as needed. If the water is extremely dirty, the system shall be continuously flushed using the make-up water station and discharging to a drain. Once the system water is clear, the pump shall be stopped, valves opened to the coil, and the entire system re-filled using fresh water and adding a cleaning agent such as trisodium phosphate (TSP). Circulate this solution throughout the piping system and continue to operate 3 hours. Then turn off the system pump and refill with fresh water. Add chemical treatment as specified in Division 23 - HVAC Water Treatment. Provide 48-hour prior notice to Engineer to allow Owner/Engineer to witness the water system start up and treatment.

## 3.8 INSTALLATION OF CONDENSATE DRAIN PIPING

A. Slope piping a minimum of 1/4" per one foot of run. Provide full size drain piping with minimum 3" deep (water seal) open (cleanable) trap at each cooling coil. Do not install the condensate drain pipe in a manner which interferes with equipment access panels. Install the condensate drain piping in a manner which will minimize the possibility of pipe being a tripping hazard or walking obstruction. Contractor shall not route condensate in a manner that allows condensate to enter a gutter whose downspouts discharge onto pedestrian walkway areas (for example, sidewalks or patios.) See plans for condensate drain material (PVC or copper).

END OF SECTION

#### **SECTION 23 21 23**

## **HYDRONIC PUMPS**

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Vertical In-Line Close Coupled Centrifugal Pumps
  - 2. Pump Specialty Fittings
    - a. Triple Duty Valves

## 1.3 SUBMITTALS

- A. Product Data: Include certified performance curves and rated capacities, operating characteristics, dimensions, furnished specialties, final impeller dimensions, motor efficiency and insulation winding classification, and accessories for each type of product indicated. Indicate pump's specified operating point on curves. For all pumps that are used in variable speed applications, insure motor is submitted showing Class F winding insulation, and insure coupling is submitted with a statement by the manufacturer that is rated for variable speed duty. Submit data on pump specialty fittings. Submit under provisions of Division 23 Common Requirements for HVAC Equipment.
- B. Operation and Maintenance Data: For pumps, submit operation and maintenance data under provisions of Division 23 Closeout Document Requirements for HVAC.
- C. Minimum Flow Data: Pump manufacturer shall indicate the minimum allowable flow rate (GPM) for loop water pumps in the submittal so the control Contractor can maintain this flow rate when programming VFD.

## 1.4 QUALITY ASSURANCE

- A. The pump control package shall be fully assembled by the manufacturer. The manufacturer shall be responsible for the complete pump control package, including system interface with pumps and VFDs, as well as the successful operation of all components supplied by the pump control system manufacturer.
- B. All functions of the variable speed pump control system shall be thoroughly field tested prior to actual start-up. This test shall be conducted with motors connected to AFD output and it shall test all inputs, outputs and program execution specific to this application.

C. Pump control package shall be listed by Underwriter's Laboratories and bear the UL label

## 1.5 DELIVERY STORAGE AND HANDLING

- A. Delivery and Requirements:
  - 1. Deliver material in accordance with Section 01 61 00 Common Product Requirements.
    - a. Deliver materials and components in manufacturer's original packaging with identification labels intact and in sizes to suit project.
    - b. Include manufacturer's name, job number, pump location, and pump model and series numbers on identification labels.
- B. Storage and Handling Requirements: Store materials off ground and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer. Storage must be weather tight, rain proof, and dust proof.
  - 1. Exercise care to avoid damage during unloading and storing.
  - 2. Leave pump port protection plates in place until pumps are ready to connect to piping.
  - 3. Do not place cable slings around pump shaft or integrated control enclosure.
  - 4. Once installed the contractor must keep a dust proof cover over the drive, motor, and integral controller.

## 1.6 WARRANTY

A. Manufacturer's warranty: The entire package shall carry an 18-month parts warranty. The drive will carry a parts and labor warranty. The motor will carry a 12-month parts and labor warranty but must be delivered to a local authorized motor warranty shop by the installing contractor. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.

## PART 2 - PRODUCTS

## 2.1 SELF-SENSING PUMP INTEGRAL CONTROLS PLATFORM WITH VFD

A. Provide where scheduled on the drawings, a pump integral controls platform. The pump control package shall be fully assembled by the manufacturer. The manufacturer shall be responsible for the complete pump control package, including system interface with pumps and VFDs, as well as the successful operation of all components supplied by the pump control system manufacturer. All functions of the variable speed pump control system shall be thoroughly field tested prior to actual start-up. This test shall be conducted with motors connected to AFD output and it shall test all inputs, outputs and program execution specific to this application. Pump control package shall be listed by Underwriter's Laboratories and bear the UL label. VFD shall be provided by the pump manufacturer.

B. The self-sensing product shall consist of a factory prepackaged and preprogrammed pump, drive, motor, and integral controls package. The drive shall be mounted and integral to the motor. It shall be mounted with rubber vibration mounts. The mounting and packing of the drive shall be done in a manner that transmitted acceleration levels will be three times below the allowable limits published by the drive manufacturer. These limits will apply to a frequency range of 0-10,000 HZ. The performance speed of this package shall 1750 RPM nominal as standard. 3600 RPM shall NOT be an allowable substitution for a specified 1750 PRM package. Pump logic controller, variable frequency drives, sensor/transmitters and related equipment shall be installed by the mechanical contractor as shown on the plans.

# C. Pump Logic Controller:

- 1. The controller operation shall operate the system using a tested and proven program that safeguards against undesirable or damaging conditions including:
  - a. Motor overload
  - b. Pump flow surges
  - c. Hydraulic cycling (hunting).
  - d. End of curve unstable operation: The pump logic controller, through a factory pre-programmed algorithm, shall be capable of protecting the pumps from hydraulic damage due to operation beyond their published end-of-curve. This feature requires a flow meter for activation. The operator interface shall include an owner adjustable flow set point to set the parameters for this routine.
- 2. The pump logic controller shall be capable of starting, unloading, and stopping pumps based on a system performance program that will minimize energy consumption, provide reliable performance and bumpless transitions.
- 3. The integrated logic controller shall be capable of running four different hydronic optimization sub-routines
  - a. Setup one: This subroutine shall allow the pump package to track a quadratic system curve and will optimize a secondary distribution loop. It shall use a technology that allows the pump, drive, and motor package to translate the hydronic data from both a pump and system curve and translate it to electrical data. This allows the drive to know exactly where it is in the hydronic world.
  - b. Setup two: This subroutine shall allow two pumps to run as backup for each other and shall alternate the pumps based on a real-time clock.
  - c. Setup three: This subroutine shall allow the package to run in a customer defined flow rate. The package will always seek to run at the user defined flow even with fouling causing system changes. It shall use a technology that allows the pump, drive, and motor package to translate the hydronic data from both a pump and system curve and translate it to electrical data. This allows the drive to know exactly where it is in the hydronic world.

- d. Setup four: This subroutine shall incorporate a traditional external sensing and control platform. It shall allow the option of controlling the pumps with three zones of differential pressure or central plant differential temperature. This optional setup shall allow the owner the option of external sensing without adding an external controller. This feature shall be equal to Taco System Logic (TSL) or equal.
- 4. The control platform shall include a subroutine that shall allow for the automatic balancing of secondary system distribution pumps. The package shall automatically run system distribution pumps to a user defined duty point and will recognize that duty point and hold the pumps at a speed that matches the actual installed system quadratic system curve. The package will then use this data to set up a new duty point as the max point for the quadratic control curve. Use of external balancing devices or contractors will not be needed.
- 5. The package shall serve as a flow metering device and will display pump flow at the user interface.

## 2.2 VERTICAL CLOSE COUPLED IN-LINE CENTRIFUGAL PUMPS

The pumps shall be the in-line, close-coupled, single stage end suction rear pullout A. type of ASTM A48 Class 30 cast iron body with bronze fitted construction with 250 psi working pressure rating. All internal components requiring service shall be accessible without disturbing pipe connections. The seal shall be serviceable without disturbing the piping connections. The capacities and characteristics shall be as called for in the plans/schedules. The pump flanges shall be ANSI Class 125 flanges. The pump casing shall be drilled and tapped for gauge ports on both the suction and discharge connections and for a drain port at the bottom of the casing. The casing shall have an additional tapping on the discharge connection to allow for the installation of a seal flush line. The pump cover shall be drilled and tapped to accommodate a seal flush line which can be connected to the corresponding tapping on the discharge connection, or to an external source to facilitate cooling and flushing of the seal faces. The pump shall have a factory installed vent/flush line to insure removal of trapped air from the casing and mechanical seal cooling. The vent/flush line shall run from the seal chamber to the pump discharge. The impeller shall be ASTM B584-836/875 bronze and hydraulically balanced. The impeller shall be dynamically balanced to ANSI Grade G6.3 and shall be fitted to the shaft with a key. The impeller shall be cast by the hydraulically efficient lost foam technique to ensure repeatability of high quality. The pump shall incorporate a dry shaft design to prevent the circulating fluid from contacting the shaft. The pump shaft shall be AISI 416 stainless steel with field replaceable bronze SAE 660 shaft sleeve. In order to improve serviceability and reduce the cost of ownership the shaft sleeve must be slip on (press on not allowable) and must be easily replaced in the field. The pump shall be fitted with a single mechanical seal, with EPT elastomers and Carbon/Ceramic faces, rated up to 250°F. This seal must be capable of being flushed externally via a tapping in the pump cover adjacent to the seal cavity. The pump shall be split coupled via a high tensile aluminum split style coupling. The design must permit easy replacement of the mechanical shaft seal without removal of the motor. The motor mount shall be designed to accept several different motor frame standards CZ and HP. Pump shall be supported by a factory manufactured ductile iron stand.

B. Pumps shall be manufactured by Bell & Gossett, Taco, Armstrong.

#### 2.3 PUMP SPECIALTY FITTINGS

A. Triple-Duty Valves: 125 psi ANSI flanged straight type or angle type body as indicated with combination non-slam type check valve/isolating valve/balancing valve. Provide external operating stem, with memory stop for balancing purposes. Provide cast iron body, brass seat, bronze disc with EPDM seat, brass or stainless-steel stem, stainless steel spring, and brass read out valves. Provide calibrated nameplate and position indicator to show from 0 to 100 percent open in 10 percent increments. Valves shall be rated at 175 psig maximum working pressure at 250°K. CV rating shall be provided at every 10% increment. Triple-duty valves shall be manufactured by Bell & Gossett, Armstrong, or Taco.

## **PART 3 - EXECUTION**

#### 3.1 PUMP INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install pumps with access for periodic maintenance including removal of motors, impellers, couplings, and accessories. Provide no less than minimum as recommended by the manufacturer.
- C. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.
- D. Lubricate pumps before startup.

## 3.2 ALIGNMENT

- A. Align piping connections. Piping shall be inspected for alignment prior to bolting to pumps.
- B. Comply with pump and coupling manufacturers' written instructions for alignment.

## 3.3 CONNECTIONS

- A. Install piping adjacent to machine to allow service and maintenance.
- B. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles. Decrease from line size to pump size with reducers.
- C. Install triple-duty valve on discharge side of pumps. Maintain minimum 5 pipe diameter between discharge of pump and triple duty valve, unless smaller dimension is specifically shown on drawings.
- D. Install shutoff valve on suction side of pumps.

E. Install pressure gages on pump suction and discharge, at integral pressure-gage tapping.

END OF SECTION

#### **SECTION 23 25 00**

## **HVAC WATER TREATMENT**

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following HVAC water-treatment systems:
  - 1. Bypass chemical-feed equipment for closed loop systems.
  - 2. HVAC water-treatment chemicals.

# 1.3 PERFORMANCE REQUIREMENTS

- A. Water quality for HVAC systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of HVAC equipment without creating a hazard to operating personnel or the environment.
- B. Base HVAC water treatment on quality of water available at Project site, HVAC system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.
- C. Closed hydronic systems, including hot-water heating, shall have the following water qualities:
  - 1. pH: Maintain a value within 8.5 to 10.5, except max is 8.5 when aluminum is present.
  - 2. Soluble Copper: Maintain a maximum value of 0.1 ppm.
  - 3. Microbiological Limits: No detectable level of bacteria.

## 1.4 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for the following products, submitted under the provisions of Division 23 Common Requirements for HVAC Equipment:
  - 1. Bypass feeders (one shot feeder) for closed loop and chemicals.
- B. Shop Drawings: Pretreatment and chemical treatment equipment showing tanks, maintenance space required, and piping connections to HVAC systems. Include plans, elevations, sections, details, and attachments to other work.
- C. Field quality-control test reports.

D. Operation and Maintenance Data: For sensors, injection pumps, and controllers to include in operation, and maintenance manuals. Submit under provisions of Division 23 - Closeout Document Requirements for HVAC.

## 1.5 QUALITY ASSURANCE

- A. HVAC Water-Treatment Service Provider: The chemical treatment shall be provided by the Owner's chemical treatment company currently maintaining the chemical treatment at Fayette County High School, Superior Water Services, no equal.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

## 1.6 MAINTENANCE SERVICE

- A. Scope of Maintenance Service: Provide chemicals and service program to maintain water conditions required above to inhibit corrosion, scale formation, and biological growth for hot-water piping, and equipment. Services and chemicals shall be provided beginning when the initial water system is filled for a period of one year from date of Substantial Completion, and shall include the following:
  - 1. Initial water analysis and HVAC water-treatment recommendations.
  - 2. Startup assistance for Contractor to flush the systems, clean with detergents, and initially fill systems with required chemical treatment prior to operation.
  - 3. Monthly field service and on-site consultation, with reports emailed to Owner and Mechanical Contractors Project Manager.
  - 4. Customer report charts and log sheets.
  - 5. Laboratory technical analysis.
  - 6. Analyses and reports of all chemical items concerning safety and compliance with government regulations.
  - 7. Test for bacteria and fungi in all Hydronic systems once during first 6 months of one-year period, and once during second half of period. Email results to Owner and Mechanical Contractors Project Manager.
- B. Initial Water System Start-Up and Treatment: See Division 23 Hydronic Piping for chemical treatment requirements at start-up.

#### PART 2 - PRODUCTS

#### 2.1 ONE SHOT CHEMICAL TREATMENT SYSTEM

- A. General: Provide and install a manual chemical "shot" feeder, similar to J.L. Wingert DB-5HD, (or approved equal), designed to discharge chemical treatment into the system using pressure from the water pump. All equipment shall be provided by a single water treatment firm.
- B. Shot feeder shall be equipped with inlet and outlet valves and drain valve. Feeder shall have a minimum 5-gallon capacity and rated for 200 psig maximum working pressure. Provide large mouth fill opening at top of cylinder.

- C. Treatment Chemicals: An analysis of a water sample taken from the site shall be performed by the water treatment supplier. The supplier shall determine the appropriate chemicals to be used to control mineral scale formation, bacteria, and corrosion. Supplier shall provide chemicals required for treating and testing water systems for one year of operation.
- D. Training: Provide instruction on the operation of the chemical feed system, including:
  - 1. Feed equipment.
  - 2. Proper use of test kits, charts.
- E. Test Kit: Provide water test equipment and reagents to verify control parameters, including pH level and concentration of corrosion inhibitor.
- F. Installation: Supplier shall provide an authorized representative to supervise the feeder installation, operational check-out, and start up service for the complete water treatment system. Representative shall provide instruction to owner's designated operating personnel. System shall be installed as shown on the plans.
- G. Supervision and Service: The manufacturer shall provide a consulting service program for a period of <u>one year</u> after Final Certificate is issued (not after start-up of system during construction period). It shall include technical assistance during installation, instruction in system pre-cleaning, and training of Owner maintenance personnel in operation, chemical feeding, and testing of water treatment system during the entire one-year period (minimum four service calls per year). A written report of each test made, chemical used and necessary recommendations will be left with designated personnel.
- H. Sequence of Operation:
  - 1. Open fill valve on top of feeder. Close inlet, outlet, and drain valves. Add necessary chemicals and close fill top.
  - 2. Open inlet and outlet valve to chemical feeder. Pump shall force water into and through feeder while system is operating. Valves shall be opened minimum 24 hours to insure adequate treatment.
  - 3. Close inlet and outlet valves to feeder after the treatment is completed. Drain valve may be used to obtain water sample for water tests.

#### **PART 3 - EXECUTION**

## 3.1 WATER ANALYSIS

A. Perform an analysis of supply water to determine quality of water available at Project site.

#### 3.2 INSTALLATION

- A. Bypass Feeders: Install in closed hydronic systems, including hot-water heating, and equipped with the following:
  - 1. Install bypass feeder in a bypass circuit around circulating pumps, unless otherwise indicated on Drawings.

2. Install a full-port ball isolation valves on inlet, outlet, and drain below feeder inlet.

## 3.3 CONNECTIONS

- A. Water treatment representative shall consult with piping installers to insure proper flow direction.
- B. Install piping adjacent to equipment to allow service and maintenance.
- C. Make piping connections between HVAC water-treatment equipment and dissimilar-metal piping with dielectric fittings. Dielectric fittings are specified in Division 23 Hydronic Piping.
- D. Install shutoff valves on HVAC water-treatment equipment inlet and outlet. Metal general-duty valves are specified in Division 23 General-Duty Valves for HVAC Piping.

# 3.4 FIELD QUALITY CONTROL

- A. Water treatment vendor shall document the following work done at each monthly site visit: on-site water analysis of each system water, necessary equipment adjustments and recommendations as a result of the present water quality. Communicate with Mechanical Contractor at time of site visit regarding any issues requiring the Contractor's attention.
- B. Tests and Inspections:
  - 1. Inspect field-assembled components and equipment installation, including piping and electrical connections.
  - 2. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational before introducing chemicals for water-treatment system.
  - 3. Place HVAC water-treatment system into operation and calibrate controls during the preliminary phase of HVAC systems' startup procedures.
  - 4. Do not enclose, cover, or put piping into operation until it is tested and satisfactory test results are achieved.
  - 5. Test for leaks and defects. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
- C. Remove and replace malfunctioning units and retest as specified above.

## 3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC water-treatment systems and equipment. Refer to Division 1 - Demonstration and Training.

## **END OF SECTION**

## **SECTION 23 31 13**

## **METAL DUCTS**

#### 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 metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch w.g. Metal ducts include the following:
  - 1. Low pressure galvanized steel ducts
  - 2. Medium pressure supply ducts and fittings
  - 3. Ductwork liner
  - 4. Duct cleaning.

## 1.3 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select the air-moving equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Engineer. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

## 1.4 SUBMITTALS

A. Submit product data under provisions of Division 23 - Common Requirements for HVAC Equipment for duct liner, medium pressure supply ducts and fittings. The Contractor may generate ductwork shop drawings for their use in coordination with structural, sprinkler, electrical, plumbing, etc., but these are not required for submittal review and shall not be submitted to the Engineer for review.

## 1.5 QUALITY ASSURANCE

- A. Construct ductwork to 2006 International Mechanical Code.
- B. Construct ductwork to ASHRAE Handbook.
- C. Fabricate ductwork in accordance with SMACNA HVAC Duct Construction Standards.
- D. NFPA Compliance:
  - 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
  - 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

## PART 2 - PRODUCTS

## 2.1 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

## 2.2 DUCTWORK ACOUSTICAL LINER

A. "Heavy Duty" Duct Liner: Glass fiber duct liner shall conform to the requirements of ASTM C1071; have a minimum noise reduction coefficient (NRC) value of 0.45 for 1/2" thickness (note that this is thickness associated with noise rating not required thickness for all applications. See insulation specification for required liner thickness.); have a maximum thermal conductivity (k) at 75°F of 0.27 and shall be tested in accordance with ASTM C518 and/or ASTM C177. The duct/plenum liner shall also comply with NFPA 90A and 90B. Sound attenuation of liner shall be tested in accordance with ASTM E477. Sound absorption shall be tested in accordance with ASTM C423. Liner's composite surface on the air stream surface shall serve as a barrier against infiltration of dust and dirt into the insulation, reducing the potential for microbial growth. Liner shall meet the requirements of ASTM C655 (corrosiveness) and odor emission and fungal resistance, ASTM G21 (fungal) and G22 (bacteria) for resistance to fungal and bacterial attack. Liner shall conform to ASHRAE 62-89. Liner surface shall provide an extremely cleanable surface during the life of the duct system. Heavy duty liner shall be "ToughGard" as manufactured by CertainTeed, "Permacote Linacoustic" as manufactured by Johns Manville, "Aeroflex Plus" as manufactured by Owens Corning, EM as manufactured by Knauf, or prior approved equal. The glass fiber liner shall have a coated or matfaced, abrasion resistant air stream surface. The liner shall be adhered to the sheet metal ductwork using an adhesive meeting the requirements of ASTM C 916. Adhesive shall be Foster 85-65 Stick Fas, Childers CP-127 Chil Quik or prior approved equal. Mechanical fasteners of the specified type and length shall be used assuring no greater than 10% compression of the liner thickness. Flat black, minimum 26 gauge galvi-grip metal nosings shall be used on the upstream transverse edges when air velocities exceed 2000 fpm or where liner is exposed to view (e.g. at supply/return grille, etc.). Also, all other traverse edges shall be completely sealed and adhered to the duct to prevent corrosion or dust accumulation.

## 2.3 SEALANT MATERIALS

- A. General: All sealants shall have a maximum flame spread of 25 and smoke development rating of 50. Sealants shall be designed for service temperature that the duct is expected to see.
- B. Water-Based Duct Joint and Seam Sealant Mastic: Flexible, adhesive sealant, and complying with NFPA requirements for Class 1 ducts. Sealant shall be low odor/low VOC with less that 32 grams/liter VOC per ASTM D-6886 or EPA Method 24. Sealant shall be SMACNA pressure class rated for -0.5" w.g. to +10.0" w.g., and shall meet SMACNA class seal for A, B and C classes. Service temperature limits of sealant shall be -10°F to 190°F. Sealant shall be fiber reinforced and shall meet UL-181A-M and UL-181B-M for mold growth test. Sealant shall use soap and water for clean up. Sealant shall be RCD #6, Foster 95-90 Vapor Safe, Childers CP-181 Comfort Seal or prior approved equal.
- C. Solvent-Based Duct Joint and Seam Sealant: One-part, non-sag, solvent-release-curing, polymerized butyl sealant. Sealant shall contain maximum 420 grams/liter VOC, and comply with ASTM D-2202 and be LEED compliant with SCAQMD Rule 1168 under Sealant category "other" with VOC max of 420 g/l. Sealant shall be SMACNA pressure class rated for +0.5" w.g. to +10.0" w.g., and shall meet SMACNA class seal for A, B and C classes. Service temperature limits of sealant shall be -20°F to 200°F. Sealant shall be Sure Grip 404 by Hard Cast, 32-14 Duct Fas by Foster or prior approved equal.
- D. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.
- E. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

## 2.4 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structuralsteel fasteners appropriate for construction materials to which hangers are being attached.
- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
  - 1. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
  1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
- E. Upper Supports: Provide supplemental angle iron (minimum size: 2" x 2" x 3/16") or Uni-Strut channels between primary building structural members to support rods and straps connected to ductwork. Size supplemental supports and hanger to adequate support load without overloading or excessive deflection.

## 2.5 RECTANGULAR DUCT FABRICATION

- A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
  - 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
  - 2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Transverse Joints: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details. Contractor has the option of using prefabricated slide-on joints and components for transverse joints, constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement. Prefabricated slide on joints shall be manufactured by Ductmate Industries, Inc., Nexus Inc., or Ward Industries, Inc.
- C. Longitudinal Seams: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-5.
- D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359-inch thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

#### 2.6 MEDIUM PRESSURE RECTANGULAR DUCTWORK

- A. Pressure Classification: The medium pressure primary air ductwork system falls into the following pressure-velocity classification:
- B. Maximum Static Pressure Rating: 4" positive
- C. Seal Class: "A" All seams, joints, fastener penetrations and connections sealed.
- D. Velocity: 4000 FPM or less.
- E. Rectangular Construction: Rectangular medium pressure ductwork shall be provided only at RTAC connections and transition immediately to round duct. Duct shall be constructed from lock forming quality galvanized steel sheets having a galvanized coating of 1-1/4 ounces total for both sides per one square foot of sheet. Sheet steel gauges and construction methods shall generally follow those indicating alternate construction methods and gauges may be followed. Refer to Table 1-8 in SMACNA Duct Construction Standards. Metal stamp shall be visible after installation.

## 2.7 PREFORMED MEDIUM PRESSURE DUCTWORK

A. Single Wall Round Ducts: Round ducts shall be the preformed spiral seam type. Ribbed standing seam duct is not acceptable. Transverse joint shall be the slip type UP TO 22". Provide Accuflange type connection for joining all ducts to ducts, and

ducts to fittings on ducts 24" and larger. Provide gasketing and screws as recommended by the manufacturer for Accuflange connection. Connection to flexible round ducts shall be made with stainless steel draw bands. Assembly and installation shall be as recommended in Section III of SMACNA HVAC Duct Construction Standards Manual. Seal all duct joints with the recommended liquid or mastic sealants.

- B. Flat Oval Ducts: Flat oval ducts, where shown (and if required to meet space limitations) shall be the preformed spiral seam type. Ribbed standing seam duct is not acceptable. Transverse joints may be the slip coupling type or flanged joints on 24" or greater minor axis ducts. Assembly and installation shall be as recommended in Section III of SMACNA Duct Construction Standards Manual. Seal all duct joints with the recommended liquid or mastic sealants.
- C. Fittings: Medium pressure fittings shall be tack welded and factory sealed. Model numbers listed below are Semco Manufacturing, Inc.'s numbers for round single wall ductwork. Substitute equivalent model numbers for double wall round and single/double wall flat oval where applicable. Equivalent fittings from other listed approved manufacturers are acceptable:
  - 1. All 45-degree or 90-degree elbows below 10": E-45-1 or E-90-1
  - 2. All 45-degree or 90-degree elbows above 10": E-45-1. E-45-3 or E-90-5 (5 piece) or E-90-2V square throat elbow with vanes.
  - 3. Branch Take-Offs from Main Ducts: CMT, CMTC, CMT-R, CMTC-R, CL W/E45 or CLC W/E45, CL-R W/E45, CLC-R W/E45
  - 4. Wye Fittings: WYE or WYE-R
- D. Standard Bullhead tees, tees, crosses, 90-degree conical fittings and laterals are not acceptable.
- E. Double Wall Ductwork: Double wall spiral formed round or flat oval insulated sheet metal duct, fabricated from galvanized steel. The double wall duct shall have internal insulation, nominal one inch thick, having a maximum thermal conductivity value (k) of 0.27 BTU/hr/sq. ft. /degrees F. The ductwork shall conform to the minimum gauges shown in the SMACNA Manual. Inner sheet metal liner shall be perforated with 3/32" holes on 3/16" staggered centers with approximately F.A. of 23%.
- F. Manufacturers: Round and flat oval preformed ductwork shall be manufactured by Semco, Monroe Metal, United Sheet Metal Company, Eastern Sheet Metal, Lewis and Lamer, Impulse-Air, Dixie Metal Products and R.V. Money or Graco.

### PART 3 - EXECUTION

#### 3.1 DUCT APPLICATIONS

- A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
  - 1. Supply Ducts: 1-inch w.g.
  - 2. Supply Ducts (Downstream of VAV Boxes): 1-inch w.g.
  - 3. Supply Ducts (From DX VAV RTAC's to VAV Boxes): 4-inch w.g.
  - 4. Return Ducts (Negative Pressure): 1-inch w.g.

- 5. Exhaust and Outdoor Air Ducts (Negative Pressure): 1-inch w.g.
- B. All ducts shall be galvanized steel.

### 3.2 DUCT INSTALLATION

- A. Drawings show the general layout of ductwork and accessories but do not show all required fittings and offsets that may be necessary to connect ducts to equipment, diffusers, grilles, etc., and to coordinate with other trades. Fabricate ductwork based on field measurements. Provide all necessary fittings and offsets at no additional cost to the Owner. Coordinate with other trades for space available and relative location of HVAC equipment and accessories on ceiling grid. Duct sizes on the drawings are inside dimensions which shall be altered by Contractor to other dimensions with the same air handling characteristics where necessary to avoid interferences and clearance difficulties.
- B. Provide pilot tube openings where required for testing of systems, complete with neoprene plug.
- C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- D. During construction provide temporary closures of metal or taped 5 mil polyethylene on open ductwork to prevent construction dust from entering ductwork system. Ductwork may not be hung prior to "drying in" of the facility unless all joints are sealed with mastic.
- E. Branches from trunk duct and tap-in connection shall be constructed in accordance with Paragraph "Low Pressure Galvanized Steel Ductwork".
- F. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
- G. Install round and flat-oval ducts in lengths not less than 12 feet unless interrupted by fittings.
- H. Install ducts with fewest possible joints.
- I. Install fabricated fittings for changes in directions, size, and shape and for connections.
- J. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.
- K. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
- L. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

- M. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- N. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.
- O. Coordinate layout with suspended ceiling, fire dampers, lighting layouts, and similar finished work.
- P. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- Q. Electrical Equipment Spaces: Contractor shall not route ducts over electrical panels.
- R. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.
- S. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire dampers are specified in Division 23 Air Duct Accessories. Firestopping materials and installation methods are specified in Division 7 Through-Penetration Firestop Systems.
- T. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."
- U. Paint interiors of metal ducts that do not have duct liner, for 24 inches upstream of registers and grilles. Apply one coat of flat, black, latex finish coat over a compatible galvanized-steel primer.

#### 3.3 APPLICATION OF FIBER LINER IN RECTANGULAR DUCTS

- A. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
- B. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
- C. Butt transverse joints without gaps and coat joint with adhesive.
- D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
- E. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.
- F. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.

- G. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
- H. Secure transversely oriented liner edges facing the air stream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
  - 1. Fan discharges.
  - 2. Intervals of lined duct preceding unlined duct.
  - 3. Upstream edges of transverse joints in ducts where air velocities are greater than 2500 fpm (12.7 m/s) or where indicated.
- I. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.
- J. Install in accordance with NAIMA Fibrous Glass and Duct Liner Standard AHS-124 and SMACNA HVAC Duct Construction Standards. Liner shall be kept clean and dry. Liner that has become wet shall be replaced. Duct dimensions indicated on the drawings are net inside dimensions required for airflow, and duct size shall be increased to allow for liner thickness.

#### 3.4 SEAM AND JOINT SEALING

- A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.
- B. Seal all circumferential and longitudinal duct joints in low pressure supply, return, outdoor air and exhaust ducts with sealant as specified herein in accordance with the manufacturer's installation instructions. This includes, but is not limited to Pittsburgh connections, snap locks (all types), etc. Duct tape is not suitable as a substitute. Notify Engineer for on-site review of ductwork joints prior to insulation application. Where gaps exceed manufacturer's recommendations for sealant only, provide fibrous backing tape.
- C. Seal ducts before external insulation is applied.

### 3.5 HANGING AND SUPPORTING

- A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- B. Use double nuts and lock washers on threaded rod supports. Duct hangers shall be constructed in accordance with Figures No. 4-1,2,4,5,6,7 and 8 as well as tables 4-1,2 and 3. Duct shall not be supported directly from metal decks. Provide upper supplemental framing as required between building structural members.

### 3.6 CONNECTIONS

- A. Make connections to equipment with flexible connectors according to Division 23 Air Duct Accessories.
- B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline (Figure 2-2, Type RE-3 and Figure 2-5,2-6). Where there is not sufficient space and at the Contractor's option in all other locations, rectangular elbows with turning vanes may be substituted.
- D. For turning vane construction see Figure 2-2, Type RE-2 and Figure 2-3 and 2-4. Provide at all square elbows in supply, return and exhaust ductwork and where noted.
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees. Provide Type 2 or Type 3 offsets where required. See Figure 2-9.
- F. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area. See Figure 2-10 for easement construction.
- G. All branch take-offs of rectangular ducts shall be made with "45-degree entry" fitting in accordance with Figure 2-8 or by means of "parallel flow branches" with turning vanes and locking splitter dampers (Figure 2-7) where indicated. All branch take-offs of round ducts shall be made with "Bellmouth take-off collar," or "45° take-off collars" as specified in Division 23 Air Duct Accessories.

## 3.7 DUCT CLEANING

A. Existing Duct Systems: Contractor shall insure interior of all ductwork is clean and free of dust at the time the Certificate of Occupancy is issued and building is turned over to the Owner, and prior to connecting existing duct to new HVAC equipment and new ductwork. Clean duct system and force air at high velocity through duct to remove accumulated dust. Close duct outlets to obtain sufficient air velocities or use portable blowers. Clean duct systems with vacuum machines as required to remove dust.

**END OF SECTION** 

### **SECTION 23 33 00**

## AIR DUCT ACCESSORIES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Backdraft dampers.
  - 2. Volume dampers.
  - 3. Fire dampers.
  - 4. Turning vanes.
  - 5. Duct access doors.
  - 6. Flexible connectors.
  - 7. Low pressure flexible ducts.
  - 8. Duct accessory hardware.
  - 9. Bellmouth take-off collars.
  - 10. 45-degree take-off collars.
  - 11. Medium pressure flexible ducts.

#### 1.3 SUBMITTALS

- A. Product Data: Submit under provisions of Division 23 Common Requirements for HVAC Equipment for the following:
  - 1. Fire dampers.
  - 2. Low pressure flexible ducts.
  - 3. Medium pressure flexible ducts.
  - 4. Bellmouth take-off collars.
  - 5. 45-degree take-off collars.
- B. For fire dampers, provide UL ratings for fire resistance, leakage velocity, differential pressure and elevated temperature. Include pressure drop data in accordance with AMCA 500-D.

## 1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Install in accordance with 2000 International Mechanical Code.

### PART 2 - PRODUCTS

#### 2.1 BACKDRAFT DAMPERS

- A. Fabricate multi-blade, parallel action backdraft dampers of 18 gage galvanized steel or extruded aluminum, with center pivoted roll formed aluminum blades with felt or flexible vinyl blade seals, linked together with 20-gauge galvanized tie bar in rattle-free manner with 90 degree stop, synthetic (acetal) sleeve bearings, and plated steel pivot pin axles.
- B. Damper manufacturer's printed application and performance data including maximum pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for pressures to 2" w.g., velocities to 2,500.0ft/min. and temperatures to 180°F. Testing and ratings to be in accordance with AMCA Standard 500. Backdraft damper shall have maximum 3-1/2" depth when blades are in the closed position. Backdraft damper shall be suitable for horizontal air flow (vertical mount) or vertical up or vertical down air flow (horizontal mount) based on the arrangement shown on the drawings. Backdraft dampers shall be provided with no flanged frame unless flange is specifically identified on the drawings. If so, see drawings for location of flange (flange on discharge or flange on intake). Backdraft damper shall be gravity type, opening by air pressure differential and closing by gravity, unless a motor pack is specified on the drawings. When motor pack is specified, backdraft dampers shall be powered open, spring closed. Motor voltage shall match fan voltage, and quantity and torque requirements of motors shall be determined by manufacturer's installation instructions. Multiple section dampers shall be assembled per manufacturer's installation instructions.
- C. Backdraft dampers shall be manufactured by Airstream, Air Balance, Pottorff, Greenheck, American Warming, Dowco, Louvers and Dampers, Empco, Industrial Louvers, Cesco or Arrow-United. Gravity backdraft dampers, furnished with air moving equipment, may be provided by equipment manufacturer, provided the damper meets the specification above.

# 2.2 VOLUME CONTROL DAMPERS, MANUAL BALANCING TYPE

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards, and as indicated. See Division 23 - Instrumentation and Control for HVAC for air control damper specifications for automatic dampers. Provide corrosion resistant end bearings. On multiple blade dampers, provide oil-impregnated nylon, molded synthetic or sintered bronze bearings. Provide hexagonal or square steel axles positively locked into the damper blade. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches provide regulator at both ends. Mark final position(s) of all damper handles by spray painting the quadrant handle and frame with red spray paint after TAB is complete. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

- B. Single Blade: Fabricate single blade rectangular dampers for duct sizes up to 12 inches in height and 36 inches in width. Duct sizes over 12 inches in height and over 36 inches in width shall require multiple blades arranged in opposed blade style. Fabricate single blade round dampers for duct sizes up to 16 inches diameter. Single blade damper frames shall be constructed of 18-gauge steel and blades shall be 20-gauge steel, minimum.
- C. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inches. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware. Frame shall be 16-gauge galvanized steel structural hat channel. Blades shall be single skin 16-gauge galvanized steel.
- D. Performance: Dampers shall be designed for 1500 fpm maximum system velocity; maximum 65 cfm/ft<sup>2</sup> leakage at 1-inch w.g. pressure per AMCA Standard 500. Wide open pressure drop shall not exceed 0.1" w.g. at scheduled size and airflow.
- E. Manual volume control dampers shall be manufactured by Ruskin, Pottorff, Nailor, Louvers and Damper, Dowco, Prefco, United Air, Arrow, Vent Products, Air Control Products, Phillips-Aire, National Controlled Air, Greenheck, Air Balance or Cesco. Single blade dampers shall be Ruskin Model MD25 (rectangular) or MDRS25 (round) or equal by the above listed manufacturers. Multi-blade damper shall be Ruskin Model MD35 or equal by the above listed manufacturers.

### 2.3 FIRE DAMPERS

A. Fire dampers shall be tested and classified by Underwriters' Laboratories for 1-1/2hour rating and shall bear the UL 555 label and meet the requirements of UL Standard 555, 6th Edition, issued June 1, 1999. Fire dampers shall be static rated, unless shown otherwise on the drawings. Dampers shall be the folding blade steel curtain type and shall be fabricated from minimum 24-gauge roll-formed galvanized steel. Each damper shall incorporate a UL listed fusible link rated at 165 degrees F and dampers intended for horizontal installations (vertical airflow) shall include stainless steel closure spring. Dampers shall be type "B" unless otherwise indicated except that type "A" dampers shall be used when connecting directly to wall register or grille, unless otherwise indicated. Each type "B" damper shall be provided with a factory fabricated steel wall sleeve. Wall sleeve length and gauge shall be determined by the contractor, based on the specific conditions of the penetration to be installed in accordance with the fire damper manufacturer's U.L. installation instructions. These specific conditions include, but are not limited to; size of connecting duct, type of duct to sleeve connection, wall or floor thickness, etc. Fire dampers shall be attached to sleeve in accordance with manufacturer's U.L. installation instructions. Clearances required between fire damper sleeves and wall/floor openings shall be in accordance with manufacturer's U.L. installation instructions. Each fire damper shall be furnished with factory provided retaining angles. Angle size and gauge shall be determined by the contractor, based on the specific conditions of the penetration, to be installed in accordance with the fire damper manufacturer's U.L. installation instructions. These specific conditions include but are not limited to; duct size, wall or floor construction, etc. Retaining angles shall be attached to the sleeve in accordance with the manufacturer's U.L.

installation instructions. Provide single side retaining angles unless conditions require retaining angles on both sides of the partition. Where round or oval ducts penetrate a wall or floor and require a fire damper, provide a rectangular fire damper with a factory furnished rectangular to round or oval transition on each side of the wall or floor connected to the sleeve. Transition shall be minimum 1" offset type. Transition shall be provided with blade stack out of air stream, and with transition positioned 1" from bottom sleeve. Rectangular damper size shall be appropriate to fit inside sleeve and allow blade stack out of air stream.

- B. Differential Pressure Rating and Velocity Rating: Dampers shall have a minimum UL 555 differential pressure rating of 4" w.g. When project conditions exist that have higher differential pressure conditions, provide dampers with 6" w.g. or 8" w.g. as appropriate. Dampers shall have a minimum UL 555 velocity rating of 2000 fpm. When project conditions exist that have higher velocities than 2000 fpm, provide dampers with minimum UL 555 velocity ratings of 3000 fpm or 4000 fpm as appropriate.
- C. Manufacturers: Fire dampers shall be manufactured by Prefco, Pottorff, Nailor-Hart, National Controlled Air, Phillips, Louvers and Dampers, Safe Air, Ruskin, Carnes, Air Balance, Greenheck, Cesco or United Air.

# 2.4 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
- B. Manufactured Turning Vanes: Fabricate single or double-vane, curved blades of galvanized sheet steel set 2" or 3-1/4" o.c. and set into vane rail runners suitable for duct mounting.
  - 1. Turning Vanes shall be manufactured by Ductmate Industries, Inc., Areo/Dyne Company, Duro Dyne Corp., METALAIRE, Inc., or Ward Industries, Inc.

#### 2.5 DUCT ACCESS DOORS

- A. Doors shall be factory fabricated, meeting requirements of SMACNA HVAC Duct Construction Standards. Contractor has the option of using either hinged/cam type doors or sandwich type doors. Insulated ducts shall be provided with factory insulated duct access doors. Access doors with sheet metal screw fasteners are not acceptable.
- B. Provide rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. Provide ½" wide door to frame gasket and frame to duct gasket. For insulated ductwork, install minimum one-inch thick insulation with sheet metal cover. Provide seals from frame to door and frame to duct.
- C. Hinged/camp type access doors smaller than 12 inches square may be secured with sash locks only (not continuous hinge).

- D. Provide continuous piano type hinge and two sash locks for sizes up to 18 x 18 inches, and two compression latches with outside and inside handles for sizes up to 24 x 48 inches. Provide double wall door construction. Access door and frame shall be fabricated from 24-gauge galvanized steel.
- E. Hinged/Cam Type Duct Access Doors for Low Pressure Round Ducts: Access doors shall be factory fabricated, with minimum 16-gauge galvanized steel door and continuous steel piano hinge. Provide plate steel strike and catch locks. Access door shall have factory installed 1" wide x 3/8" thick polyethylene gasket. Contractor shall field cut hole one inch smaller than door width and height.
- F. Sandwich Type Access Doors: Doors shall consist of layers of stamped steel. The inside panel, installed inside duct, shall consist of metal plate with closed cell full perimeter neoprene gasket, bonded to the inside door. Service temperature of gasket shall be -20°F to 200°F. Outer door shall consist of steel, with polypropylene hand knobs with threaded metal inserts, such that door is removable without tools. Springs shall be conical zinc plated, and bolts shall be zinc plated sealed to the inner door. A self-adhesive template shall be provided for the exact size of duct opening required. Doors shall be tested to 20-inch positive and 10-inch negative static pressure with no leakage noted. Doors shall be factory insulated with two layers of interior metal with insulation between the two when duct is specified to be insulated.

#### G. Manufacturer:

- 1. Hinged/cam type doors shall be Model #HAD-10 by Venco or DT by Elmdor or equal by Ductmate, Phillips-Aire, Air Balance, Kees, Pottorff, Ruskin, Nailor, Greenheck, Cesco, National Controlled Air or Safe Air.
- 2. Sandwich type doors shall be Model D (rectangular) or DR (round) as manufactured by Ductmate or equal by Phillips-Aire, Air Balance, Kees, Pottorff, Ruskin, Nailor, Greenheck, Cesco, National Controlled Air or Safe Air.

### 2.6 FLEXIBLE CONNECTORS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards, and as indicated. Flexible connections must be in compliance with appendix "D" NFPA 90A requirements.
- B. Manufacturers:
  - 1. Ductmate Industries, Inc.
  - 2. Duro Dyne Corp.
  - 3. Ventfabrics, Inc.
  - 4. Ward Industries, Inc.
- C. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Select metal compatible with ducts.

- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
  - 1. Minimum Weight: 26 oz. /sq. yd.
  - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
  - 3. Service Temperature: Minus 40 to plus 200 deg F.

### 2.7 FLEXIBLE LOW-PRESSURE ROUND DUCTWORK

General: Insulated low pressure flexible duct shall be a factory fabricated assembly A. consisting of a non-perforated polyester film inner liner, zinc-coated spring steel helix, wrapped with fiberglass insulation and a bi-directional reinforced metalized polyester film outer vapor barrier wrap. The insulation shall have a minimum R of 4.2 except that a R value of 8.0 shall be provided for all flex ducts located above insulation boundary in attics. R value of 8.0 shall also be provided for any flex ducts specifically identified on the drawings with R-8 insulation requirements. Insulation shall have a maximum conductance (C) of 0.238 at 75°F. The insulations thermal performance shall be measured in accordance with the ADC Flexible Duct Performance and Installation Standards (1991) using ASTM C518. The composite assembly, including insulation and vapor barrier, shall meet the Class 1 requirements of NFPA 90-A and be labeled by Underwriters' Laboratories, Inc., with a flame spread rating of 25 or less and a smoke developed rating of 50 or less. Low pressure flexible ductwork shall be manufactured by Certain Teed, Thermaflex, Genflex, Metraflex, Atco or Flexmaster. Flexible duct with R value of 8.0 shall be model G-KM-R-8 as manufactured by Certain Teed, or equal by Thermaflex, Genflex, Metraflex, Atco or Flexmaster.

### 2.8 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

### 2.9 BELLMOUTH TAKE-OFF COLLARS

A. General: All take-offs for round ducts from trunk ducts which are minimum 4" deeper than round duct take-off size shall be fabricated in the shape of a "bellmouth" entrance of 26-gauge galvanized G90 steel with 28-gauge body and 26 gauge balancing damper with operator handle. Damper shall be factory installed with quadrant operator handle, retractable spring-loaded threaded bearings and wing lock nut. On insulated ducts, provide optional extended neck for damper handle to allow handle to clear specified insulation thickness. Bellmouth shall include neoprene gasket and a minimum of 5 pre-drilled mounting holes. "Spin-In" fittings with air scoops and dampers are unacceptable unless specifically called out on drawings for ducts 5" and smaller.

B. Manufacturers: "Bellmouth" fitting shall be model number BM-D (uninsulated ducts) or model number BMD-ISG (insulated ducts) as manufactured by Buckley Air Products or model number 3210-BD (uninsulated ducts) or model number 3210-BDS (insulated ducts) as manufactured by Crown or Model BMD (uninsulated ducts) or Model BMD-E (insulated ducts) as manufactured by United Enertech or Model ATDBM by Southwork. No substitutions are permitted.

### 2.10 45° TAKE-OFF COLLARS

- A. General: Take-offs for round ducts from trunk ducts which are less than 4" deeper than the round duct take-off size shall be made with a 45° side take-off fitting constructed of 26-gauge galvanized steel with G90 lock-forming quality. Fittings shall have 1" wide mounting flange with pre-drilled mounting holes and an adhesive coated gasket to minimize leakage. Fitting shall have a balancing damper with operator handle. A locking quadrant shall be provided for damper rod. On insulated ducts, provide optional extended neck for damper handle to allow handle to clear specified insulation thickness.
- B. Manufacturers: Crown 3300D (uninsulated ducts) or 3300-DS (insulated ducts), Flexmaster STO-D (uninsulated ducts) STO-D-B02 (insulated ducts), Sheet Metal Connectors, Inc. model HET (uninsulated) or model HET with 1.5-inch standoff (insulated), Buckley Model 3300D (uninsulated ducts) or Model 3300D-ISG (insulated ducts), or Model AT63WD by Southwork.

### 2.11 FLEXIBLE MEDIUM PRESSURE ROUND DUCTWORK

- A. General: Insulated medium pressure flexible duct shall be a factory fabricated assembly consisting of an acoustically rated chlorinated polyethylene (CPE), corrosion resistant inner core fiberglass insulation, sheathed in a bi-directional reinforced metalized polyester film outer vapor barrier jacket. The composite assembly, including vapor barrier and insulation, shall meet the Class 1 requirements of NFPA 90A and be labeled by Underwriter's Laboratories, Inc., with a flame spread rating of 25 maximum and a smoke developed rating of 50 maximum. The insulation shall have a minimum R of 4.2 and maximum conductance (C) of 0.238 at 75°F. Maximum operating pressure shall be 10-inch water column positive for 4 to 12-inch diameter, and 6 inch water column for 14 to 16 inch diameter, and maximum 5,000 feet per minute velocity. All medium pressure flexible duct connections shall be made by thoroughly coating the interior of the duct to a depth of 3" with an approved high-pressure duct sealer and secured in place over a sheet metal collar with ½" wide positive locking stainless steel straps and draw band.
- B. Manufacturers: Metalflex, Atco. Thermaflex or Flexmaster.

#### **PART 3 - EXECUTION**

### 3.1 APPLICATION AND INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in accordance with manufacturer's instructions.

- B. Provide balancing dampers at points on low pressure systems where branches are taken from larger ducts and as required for air balancing. Use splitter dampers where indicated.
- C. Provide air turning devices in all elbows in supply, return, outdoor air and exhaust ducts.
- D. Some branch duct take-offs to ceiling diffusers may be indicated on the plans to be made with square or rectangular duct take-offs out the bottom of the supply ducts due to space restrictions. At these take-offs, provide equalizing grids behind the diffusers to insure uniform airflow behind the diffuser.
- E. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, use stainless-steel accessories in stainless-steel ducts, and use aluminum accessories in aluminum ducts.
- F. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.
- G. Fire Dampers: Fire dampers shall be installed in accordance with the recommendations of SMACNA Fire Damper and Heat Stop Guide for Air Handling Systems and NFPA 90A and International Mechanical Code. Installation shall also conform to the UL installation instructions furnished by the manufacturer. Provide submittal data on dampers and installation instructions. Provide fire dampers where ducts penetrate fire rated walls.

## H. Duct Access Doors:

- 1. Access doors shall be sized by contractor to provide appropriate access for service. Access door material and pressure rating shall match ductwork. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories as follows:
  - a. Adjacent to fire dampers, providing access to reset or reinstall fusible links.
- 2. Install the following sizes for duct-mounting, rectangular access doors:
  - a. One-Hand or Inspection Access: 8 by 5 inches.
  - b. Two-Hand Access: 12 by 6 inches.
- 3. Install the following sizes for duct-mounting, round access doors:
  - a. One-Hand or Inspection Access: 8 inches in diameter.
  - b. Two-Hand Access: 10 inches in diameter.
- 4. Label access doors according to Division 15 Section "Mechanical Identification."
- 5. Review locations prior to fabrication. Locate access doors with sufficient room to allow door to fully open.
- I. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment unless specifically noted otherwise. Flexible connectors are not required on equipment that has internal flexible connectors.

- J. Connect terminal units to medium pressure supply ducts with maximum 12-inch lengths of medium pressure flexible duct. Do not use flexible ducts to change directions.
- K. Install duct test holes where indicated and required for testing and balancing purposes.
- L. Branch take-offs of sheet metal ductwork from truck ducts shall be made with 45-degree branch entries or splitter dampers and elbows with turning vanes as indicated. See Division 23 Metal Ducts. Air scoops, deflectors, extractors and other devices are prohibited unless noted otherwise.
- M. Bellmouth and 45° Branch Entry Fitting Installation: Gasketed Bellmouth and 45° branch entry fitting take-off collars shall be screwed into the side of sheet metal duct with a minimum of 5 screws. Provide duct sealant around perimeter of take off connection to trunk duct; integral gasketing is not a substitute for duct sealant. Where the supply duct is not 4" deeper than the diameter of the take-off collar, the protruding edges of the bellmouth shall be bent over the top and bottom of the duct with a vice-grip hand brake in accordance with the manufacturer's recommendations. Inner core of flexible duct shall be connected to the bellmouth and 45° branch entry fitting take-off collar with a stainless-steel band and outer vapor barrier with minimum 1/2" wide nylon zip strip. Insulate entire bellmouth and 45° branch entry fitting (except operator handle) with 2" thick ductwrap.

## 3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 23 Division 23
   Testing, Adjusting, and Balancing for HVAC.

### 3.3 CONNECTION OF FLEX DUCTS

A. Secure all flexible ducts with ½" wide stainless-steel draw bands with worm gear assembly and hardened tightening screw. After metal band is installed on the inner duct, the exterior vapor barrier shall then be secured with nylon "zip-strip" bands. Flexible duct support width shall be minimum 4" wide and shall extend at least ½ of the circumference of the flexible duct. Flexible ducts shall be installed in a fully extended condition free of sags and kinks, using only the minimum length required to make the connection. Ends of flex duct shall be secured with metal draw bands (nylon "zip-strips" are not acceptable). Installation, including attachment and support, shall be in accordance with the manufacturer's written instructions and with the latest edition of SMACNA Flexible Duct Installation Standards. Flexible duct runs shall be a maximum of 8', unless a longer length is specifically shown on the drawings.

#### **END OF SECTION**

#### **SECTION 23 36 00**

### AIR TERMINAL UNITS

#### PART 1 - GENERAL

### 1.1 SECTION INCLUDES

- A. VAV Terminal Units
- B. Fan Powered Box Terminal Units
- C. Integral Variable Volume Dampers
- D. Integral Hot Water Heating Coils

#### 1.2 REFERENCES

- A. Current enforced editions of the following shall be used:
  - 1. NFPA 90A Installation of Air Conditioning and Ventilation Systems.
  - 2. UL 181 Factory-Made Air Ducts and Connectors.
  - 3. ARI 885 Standard for Estimating Occupied Space Sound Levels in the Applications of Air Terminals and Air Outlets.
  - 4. ETL Agency listing for unit construction and operation.
  - 5. ARI-880 Standard for Variable Volume Air Terminals.

## 1.3 SUBMITTALS

- A. Submit shop drawings and product data sheets indicating configuration, general assembly, and materials used in fabrication under the provisions of Section 23 05 13.
- B. Submit catalog performance ratings which indicate air flow and static pressure.
- C. Submit radiated sound power levels (2nd through 7th octave bands) at design maximum operating conditions. Also submit Radiated Sound and Discharge Sound NC values. NC levels for radiated and discharge NC levels shall be based on attenuation values as outlined in ARI Standard 885-98, Appendix E. Radiated sound attenuation values shall be based on Type 2, Mineral Fiber Tile at 5/8" thick.
- D. Submit configuration (left or right hand) for each unit based on configuration shown on drawings.
- E. Submit data on flow sensor gain constant and proof of minimum 0.03" signal at 450 fpm.
- F. Submit fan curves for fan powered boxes showing box airflow at specified static pressure.

## 1.4 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 23 05 14.

## 1.5 EXTRA MATERIALS

A. See Section 23 05 14 for the supply and transfer of extra materials to the Owner.

## 1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not operate boxes for any purpose, temporary or permanent, until ductwork is clean, AHU filters are in place, AHU bearings lubricated, and all equipment has been test run under observation and is operating properly.

## 1.7 WARRANTY

A. See Section 23 05 14 for warranty information.

#### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. General: Manufacturers must participate in the ARI Certification program. Unit performance data must be rated and certified in accordance with ARI Standard 880, and must display the ARI seal on all standard units. All sound data shall be based on tests conducted in accordance with ARI-880. Sound performance shall be ARI certified.
- B. Specified Manufacturers: Nailor Industries, Tuttle and Bailey, York/JCI, Metal-Aire, Enviro-Tec, Titus/Magnaflow, or Price.

## 2.2 MANUFACTURED UNITS

- A. Concealed variable air volume supply air control terminals for connection to single medium pressure duct central air systems, with variable volume, pressure independent control, and unit mounted hot water heating coil. Fan powered boxes shall be parallel flow type with fan not in series with primary air.
- B. Identify each airflow unit with clearly marked, engraved identification label and airflow indicator. Label shall include unit nominal air flow, maximum scheduled air flow, minimum scheduled air flow, hot water coil GPM.

### 2.3 FABRICATION

- A. Casings: Units shall be completely factory assembled, manufactured of zinc coated corrosion protected steel, and fabricated with a minimum of 22-gauge metal. Housing shall be sealed and gasketed with leak resistant construction.
- B. Insulation: Entire interior of VAV and fan powered box shall be internally insulated with minimum 1" thick dual density fiberglass insulation, with high density skin (exposed to air stream) and low density core. Insulation shall comply with UL 181 for air erosion, UL 181 for mold growth and humidity, UL 723 for flame and smoke of 2550, ASTM E84 for Flame and Smoke of 2550, and ASTM C665 for fungi resistance. Installed thickness shall provide minimum thermal conductance of insulation of 0.26." BTU / h / ft  $^2$ °F at  $^2$ 75°F, or R = 3.9.

- C. Plenum Air Outlets: Slip and drive duct connections on unit discharge connection.
- D. Inlet Connection: 2" long for allowing duct connection.

### 2.4 VOLUME DAMPER

A. Locate air volume damper inside unit casing. Construct from extruded minimum 18 gauge aluminum or 20 gauge (0.9 mm) galvanized steel components. Key damper blades into shaft with nylon fitted pivot points. Damper shaft shall be mounted in self lubricating bearings.

## 2.5 VARIABLE FLOW SENSOR

- A. Units shall not require periodic maintenance. All units shall permit external mechanical adjustment to reset the maximum and minimum volume of air. Calibration dials shall indicate the delivery of air without any other flow measurements. The primary air throttling terminal devices shall maintain constant volume at all flow rates dictated by the room thermostat, regardless of changes in duct pressures upstream and/or downstream of the device. Multi-point flow sensor shall be ring or cross with minimum four (4) sampling points, with gauge ports for field measuring. Flow sensor shall send an amplified differential pressure signal of at least 0.03" wg at an air velocity of 450 feet per minute. The device shall be pressure independent at all flow rates within its published capacity range. VAV and fan powered box damper's nominal rating may not be exceeded.
- B. Means for air balancing and pressure shall be a factory furnished and mounted multipoint (minimum 4 point), multi-axis flow ring or cross, and differential pressure transducer. Flow-thru or hot wire devices are not acceptable. Unit shall be capable of maintaining air flow to within 5 percent of rated unit airflow set point with 1.5 duct diameters straight duct upstream from the unit.

## 2.6 ACTUATOR AND DDC CONTROLLER

A. Electric actuator and DDC controller shall be furnished by controls contractor to VAV and fan powered box manufacturer. Box manufacturer shall factory mount actuator and controller. Controller shall be matched with the sensor gain of the flow sensor to allow proper control at minimum cfm (minimum differential pressure signal) and at maximum cfm (so transducer is not overloaded). Transducer controller maximum pressure limits shall not be exceeded with the velocity pressure at maximum cfm and sensor gain of submitted flow sensor.

### 2.7 HOT WATER HEATING COILS

A. Coils shall be standard accessory furnished by the box manufacturer. Coil shall be minimum 1/2" O.D. seamless copper with 0.016" wall thickness and leak tested at 300 psig. Fins shall be aluminum. Coil design and application shall be self-draining, having no pockets in any circuit. Where manufacturer offers an option for factory installed manual air vent, manual air vent shall be supplied. Supply and return tube connection shall be at the same end, and shall be on the same side of the VAV and fan powered box as that shown on the drawings. Coils shall be tested and certified to ARI Standard 410.

Coils shall be factory furnished and factory mounted on box for VAV boxes, and shall be factory mounted on induced air stream upstream of fan on fan powered boxes. Discharge at coils on VAV boxes shall have slip and drive construction for connection to metal ductwork. Coil shall be contained in a 0.030" (22 gauge) galvanized steel casing.

#### 2.8 WIRING

- A. Mount electrical components in control box with removable cover. Box manufacturer shall factory mount a DDC controller provided by successful DDC controls manufacturer to each VAV and fan powered box. Mount actuator, controller and controls on side as shown on plans. The DDC controller for each VAV and fan powered box shall be factory wired to the actuator and transformer prior to shipment to the job site. Incorporate single point electrical connection to power source to supply all components.
- B. VAV and fan powered box manufacturer shall factory mount transformer at each box for control voltage. Transformer for each box shall be provided by VAV box manufacturer. Controls contractor shall furnish VAV and fan powered box manufacturer with VA load of actuator, hot water valve, and DDC controller. Provide terminal strip in control box for field wiring of all required sensors and for connection to field installed hot water valve. Hot water valve is provided by controls contractor. Provide appropriate primary and secondary voltage as required, and fusing as required by NEC. See electrical drawings for primary voltage.

### 2.9 FAN ASSEMBLY

- A. Steel forward curved centrifugal type fan with direct drive permanently lubricated, permanent split capacitor type, thermally protected motor. Shaded pole motor is not acceptable. Motor must be capable of continuous operation under maximum fan load with no external static pressure. Provide a backdraft damper at the fan section outlet to prevent cold primary air from flowing back through the fan into the ceiling cavity and return air plenum.
- B. Provide factory installed electronic variable speed controller with minimum voltage stop to insure motor will not operate in the stall mode.
- C. Isolate fan motor assembly from casing on rubber isolators or resilient rings.
- D. Filter rack and filters shall be provided at inlet to fan assembly upstream of hot water coil. Filter shall be 1" thick throw away type.

### 2.10 MAXIMUM LEAKAGE

- A. Maximum Casing Leakage: Three (3) cfm at one (1) inch WG inlet static pressure.
- B. Maximum Damper Leakage: Two (2) percent of design air flow at three (3) inch WG inlet static pressure in fully closed position.

#### **PART 3 - EXECUTION**

## 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Suspend VAV and fan powered units from 1" wide 20 gauge galvanized straps attached to 1-1/2" x 1-1/2" x 1/4" angle iron framing attached (welded) to building structural members in area with steel roof framing and directly to concrete deck in areas with concrete roof deck. See also Section 23 05 29.
- C. Units shall be fully insulated at the factory to ensure that the unit will not sweat at 50°F entering air. Any unit that has condensation forming on its exterior shall, at the Owner's option, be (1) removed and returned to the factory for re-insulating or (2) field wrapped with 2" thick fiberglass insulation (complying with the requirements of section 23 07 16 for supply duct) or (3) replaced with a new unit to eliminate the problem. These corrective actions (if necessary) shall be made at no additional cost to the Contract.
- D. Provide minimum of three (3) inlet diameters (or more if required by manufacturer) of straight duct upstream of VAV and fan powered box connection. Provide maximum of 12" of medium pressure flex duct at inlet. Flex duct shall be straight. Inlet duct shall be the same size or greater than the VAV and fan powered box connection size.
- E. Control enclosure for actuator and controller shall be installed a minimum of 24" from any obstruction to allow service clearance to the actuator and controller. Access panel for blower access on fan powered box shall be unobstructed and easily accessible.
- F. Provide flexible duct connection on discharge of fan powered boxes.

END OF SECTION

#### **SECTION 23 37 13**

## DIFFUSERS, REGISTERS, AND GRILLES

#### 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 ceiling- and wall-mounted diffusers, registers, and grilles.

#### 1.3 SUBMITTALS

- A. Product data shall be submitted under the provisions of Division 23 Common Requirements for HVAC Equipment. For each product indicated, include the following:
  - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
  - 2. Diffuser, Register, and Grille Schedule: Indicate grille designation (i.e., tag), model number, size, and accessories furnished. Do not indicate quantity in the submittal.

## 1.4 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. The grilles, registers, and diffusers shall be manufactured by Carnes, Krueger, E. H. Price, Air Devices, Nailor-Hart, Kees, Air Louvers, Anemostat, Tuttle and Bailey, Titus/J & J or Metal\*Aire.

## 2.2 GRILLES AND REGISTERS

A. Egg Crate Grilles and Registers: All aluminum extruded grille with aluminum opposed blade damper, where scheduled, 1" x 1" x 1" egg crate grid and baked enamel finish. Sight restricted egg crates with 45° core shall be 1/2" x 1/2" x 1/2".

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
- C. Install items in accordance with manufacturer's instructions.

## 3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

#### **END OF SECTION**

#### **SECTION 23 41 00**

## PARTICULATE AIR FILTRATION AND BI-POLAR IONIZATION UNITS

#### 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 factory-fabricated air-filter devices and media used to remove particulate matter from air for HVAC applications. This section also includes bipolar ionization units designed to kill mold, virus, bacteria and odors.

## 1.3 SUBMITTALS

- A. Product Data: Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; for each model indicated. Submit under the provisions of Division 23 Common Requirements for HVAC Equipment, for the following:
  - 1. Medium Efficiency (MERV 8) Filters (RTU and Terminal Units)
- B. Operation and Maintenance Data: For each type of filter and rack, submit operation and maintenance data under the provisions of Division 23 Closeout Document Requirements for HVAC.

# 1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of air filters and are based on the specific system indicated. Refer to Division 1 Product Requirements.
- B. Comply with ASHRAE 52.1 and ASHRAE 52.2 as specified herein for method of testing and rating air-filter units.
- C. Comply with NFPA 90A and NFPA 90B.

### 1.5 EXTRA MATERIALS

A. Furnish extra materials under the provisions of Division 23 - Closeout Document Requirements for HVAC.

### PART 2 - PRODUCTS

#### 2.1 MEDIUM EFFICIENCY MERV 8 30% FILTERS

- A. Filters shall be 1", 2" or 4" deep medium efficiency, pleated, disposable type, as noted in the specification for each product, or as noted on the drawings. Each filter shall consist of synthetic fiber media bonded to an electro-finish wire which itself is bonded to a heavy-duty fiberboard frame. The filter shall be listed by Underwriter's Laboratories as U.L. Class 2. The filter media shall be 100% synthetic continuous fiber. Filters shall have a minimum efficiency reporting value of MERV 8 when evaluated under the guidelines of ASHRAE 52.2-1999. When tested in accordance with the ASHRAE 52.1-92 standard, the media shall have an average dust spot efficiency of 25-30%. Efficiency on 1.0-micron size particles shall not be less than 40% using the laser particle counter. The filter media wire support shall be 24 ga. 1" x 1" electro-finish wire with a 96% open area. The welded wire backer shall be bonded to the media to prevent media movement. The pleated wire support shall allow total use of the filter media. The filter frame shall be heavy duty fiberboard, die cut for dimensional accuracy. The frame webbing shall be bonded to the filter pack, upstream and downstream, to ensure even pleat spacing. All ends of the filter shall be bonded to the inside of the frame to prevent air by-pass. The filter shall be capable of withstanding 2.0" w.g. without failure of the media pack. The 2" deep filter shall have not less than 15 pleats per linear foot with an average effective media area of 4.6 square feet per square foot of filter face area. The 4" deep filter shall have not less than 11 pleats per linear foot with an average effective media area of 7.0 square feet per square foot of filter face area. Media thickness shall be minimum 0.15 inches. Dust holding capacity when evaluated using ASHRAE test dust shall be at least 170 grams. The initial resistance at 500 fpm shall not exceed 0.30" w.g. Filter shall be Camfil-Farr model Aeropleat IV + or equal by approved manufacturer listed herein.
- B. Manufacturers: Filters shall be manufactured by American Air Filter, Camfil-Farr, Airguard, Flanders, Continental, Purolator or EcoAir.

#### PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install filter and filter frames according to manufacturer's written instructions.
- B. Position each filter unit with clearance for normal service and maintenance. Provide adequate clearance for filter access door opening.
- C. Install filters in position to prevent passage of unfiltered air. Provide filter blanks as required to prevent bypass of unfiltered air between filters.
- D. All filter racks and filter housings, whether integral with HVAC equipment or manufactured by filter manufacturer, shall be provided with a neoprene gasket seal on filters with MERV 7 or greater rating. Contractor shall field install gasketing if not provided by HVAC manufacturer. Urethane gasket shall not be allowed.

E. Contractor shall refer to the drawings and equipment specification sections for product type of filter for each piece of equipment. If no product type is indicated, contractor shall provide filter media efficiency and standard thickness as required by the manufacturer, and filter shall be, as a minimum, medium efficiency 20% filters.

**END OF SECTION** 

### **SECTION 23 51 00**

## BREECHINGS, CHIMNEYS, AND STACKS

#### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Special gas vents.
  - 2. Type B gas vents.

## 1.3 SUBMITTALS

- A. Product data for each type of vent shall be submitted under the provisions of Division 23 Common Requirements for HVAC Equipment, and shall include the following:
  - 1. Special gas vents.
- B. Shop Drawings: For vents, breechings, chimneys, and stacks. Include plans, elevations, sections, details, and attachments to other work.

## 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain listed system components through one source from a single manufacturer.
- B. Certified Sizing Calculations: Manufacturer shall certify venting system sizing calculations.

## 1.5 COORDINATION

A. Coordinate installation of r roof penetrations. These items are specified in Division 23 - Hangers and Supports for HVAC Piping and Equipment.

## 1.6 WARRANTY

A. See Division 23 - Closeout Document Requirements for HVAC for warranty information.

### PART 2 - PRODUCTS

### 2.1 SPECIAL GAS VENTS

- A. Double wall, Prefabricated system listed to UL-1738, Standard for Venting Systems for Gas-Burning Appliances, Categories II, III, and IV made with AL29-4C stainless steel inner liner, 1" insulating air space, and 400 series stainless steel outer jacket. Vent shall be designed for maximum 550°F and positive pressure of 15" W.C.
- B. Complete with: factory appliance flue connector, boot tees, drain caps or inline drains, stack supports, roof flashings, and termination. All items specifically required by Appliance and Gas Vent manufacturers installation instructions.
- C. Manufacturers: Heat-Fab CI PLUS, Metal-Fab CORR/GUARD, M&G Duravent FasNSeal, Security Chimneys SSD, or Schebler Chimney Systems EVENT.

#### 2.2 TYPE B GAS VENTS

- A. Prefabricated system listed to UL-441 Standard for Gas Vents made with aluminum alloy inner liner, insulating air space, and galvanized steel or galvalume outer jacket. Vent shall be designed for maximum 480°F and negative pressures only.
- B. Complete with: factory appliance flue connector, elbows, gas vent supports, roof flashings, and termination. All items specifically as specified by Appliance and Gas Vent manufacturers installation instructions.
- C. Manufacturers: Ampco R, M&G DuraVent, Enervex, Ecco Manufacturing, Metal-Fab M, or Selkirk MetalBest RV/QC.

### 2.3 FLUE CAPS

A. The flue caps shall be sized and approved by the gas vent manufacturer as a part of the vent system.

### **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF LISTED VENTS AND CHIMNEYS

- A. Locate to comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.
- B. Seal between sections of positive-pressure vents according to manufacturer's written installation instructions, using sealants recommended by manufacturer.

- C. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
- D. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.
- E. Lap joints in direction of flow.
- F. Clean flues during installation, removing all dust and debris.
- G. Erect stacks plumb to finished tolerance of no more than 1 inch out of plumb from top to bottom.

## 3.3 INSTALLATION OF FLUES

- A. Install flues in accordance with recommendations of ASHRAE-Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems", and ANSI Z223.1 (NFPA 54) and NFPA 211.
- B. Sizing of flues shown on the drawings is an estimate only. Over sizing or under sizing of flues from gas fired equipment can result in improper gas fired equipment operations. Appropriate sizes vary from manufacturer and must be selected by the specific gas equipment manufacturer selected by the Contractor. Submit statement from the gas fired equipment manufacturer and install these sizes at no additional cost to the Contract.

**END OF SECTION** 

### **SECTION 23 52 30**

## **CONDENSING BOILERS**

#### 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 packaged, factory-fabricated and -assembled, gas-fired, condensing boilers, trim, and accessories for generating hot water.

#### 1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories. Product data for each type of product included herein shall be submitted under provisions of Division 23 "Common Requirements for HVAC".
- B. Obtain and submit installation permit from Georgia Department of Labor, Safety Engineering Section for applicable gas fired equipment.
- C. Field quality-control reports.
- D. Operation and Maintenance Data: For boilers, components, and accessories, submit copies of operation and maintenance data under provisions of Division 23 "Closeout Document Requirements for HVAC".

### 1.4 WARRANTY

A. See Division 23 "Closeout Document Requirements for HVAC" for warranty information.

## 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code. Boiler shall be ASME stamped.
- C. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil-Fired Boilers Minimum Efficiency Requirements."

- D. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers."
- E. I=B=R Compliance: Boilers shall be tested and rated according to HI's "Rating Procedure for Heating Boilers" and "Testing Standard for Commercial Boilers," with I=B=R emblem on a nameplate affixed to boiler.
- F. UL Compliance: Test boilers for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.
- G. Boiler shall be AGA certified, conforming to State of New Jersey Boiler Code requirements and ASME CSD-1.

### 1.6 COORDINATION

A. Coordinate size and location of extensions to existing concrete bases. Cast anchorbolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 23 "Hangers and Supports for HVAC Piping and Equipment".

### PART 2 - PRODUCTS

#### 2.1 PACKAGED CONDENSING BOILER

- A. General: Provide and install a packaged condensing hot water boiler for gas fuel complete with fuel burning equipment, safety and operating controls, and appurtenances as hereinafter specified with minimum 92% thermal efficiency. The boiler shall be fully assembled and wired by the manufacturer, requiring only connection to power, fuel supply, and system piping to be ready for operation. Boiler shall meet all requirements of State of Georgia Boiler Code, ASME's "CSD-1", AGA and the National Board Inspection Code and bear the ASME "H" stamp. Contractor shall obtain and pay for a Boiler Installation Permit and arrange for all necessary inspections from the Georgia Department of Labor and submit copy to the Architect/Engineer.
- B. Construction: The boiler shall be constructed with a heavy gauge steel jacket assembly, primed and pre-painted on both sides. The combustion chamber shall be sealed and completely enclosed, independent of the outer jacket assembly, so that integrity of the outer jacket does not affect a proper seal. A burner/flame observation port shall be provided. The burner shall be a premix design and constructed of high temperature stainless steel with a woven metal fiber outer covering to provide modulating firing rates. Boiler shall be supplied with a gas valve designed with negative pressure regulation and be equipped with a variable speed blower system, to precisely control the fuel/air mixture to provide modulating boiler firing rates for maximum efficiency. There shall be no bonding material, bolts, gaskets or "O" rings in the header construction. The boiler shall have a 316L stainless steel, fire tube heat exchanger. The heat exchanger shall be designed for single-pass, flow through arrangement and shall drain condensation to the bottom of the vessel. The boiler shall operate in a safe condition at a derated output with gas supply pressures as low as 4 inches of water column. The burner flame shall be

ignited by spark ignition with flame monitoring via a flame sensor. Modulating control shall be provided to energize when a factory installed flow switch is made and the control system specified in Division 23 "Instrumentation and Control for HVAC" is calling for heat injection, subject to the boiler's internal safety and temperature operating controls.

## C. Controls:

- The boiler shall utilize a 24 VAC control circuit and components. The 1. control system shall have a Liquid Crystal touch screen display for boiler set-up, boiler status, and boiler diagnostics. All components shall be easily accessed and serviceable from the front of the jacket. The boiler shall be equipped with a high limit temperature control with manual reset; outlet water temperature sensor; return water temperature sensor; outdoor air sensor, flue temperature sensor; high and low gas pressure switches, low water cut off with manual reset and a condensate trap for the heat exchanger condensate drain. Boiler operating and safety controls shall include modulating gas valve(s), low water cut-off (probe type), secondary electric high limit control, transformer, electronic intermittent pilot ignition, electronic flame failure supervision with 100% shut-down within .8 seconds, all contactors and starters, and junction box. Controls shall be factory adjusted and shall be housed in a galvanized steel compartment, protected from dust, moisture and pilot extinction. The fuel train shall contain, as a minimum, a main gas line manual shutoff valve, a main gas line pressure regulator, a manual reset low pressure gas cut off, a normally closed safety shutoff valve, a second normally closed operating valve and a manual reset high pressure gas cut off. Functions of the fuel train may be combined in a single combination valve. A factory installed gas pressure regulator shall be furnished integral with this equipment to regulate the incoming gas pressure to the manifold pressure recommended by the manufacturer. This regulator shall be capable of, and the equipment shall function properly, over an inlet pressure range of 5" w.c. (minimum) to 14" w.c. (maximum).
- 2. The boiler shall feature a liquid crystal touch screen display, password security, outdoor air reset, and PC port connection. The boiler shall have alarm contacts for any failures, runtime contacts and data logging of runtime, ignition attempts and ignition failures. The boiler shall allow 0-10 VDC input connection for DDC system control and have built-in "Cascade" to sequence and rotate while maintaining modulation of up to eight boilers without utilization of an external controller.
- 3. The boiler shall be equipped with two terminal strips for electrical connection. A low voltage connection board with minimum 30 data points for safety and operating controls, (i.e., Alarm Contacts, Runtime Contacts, two Flow Switches, Remote Enable/Disable, System Supply Sensor, Outdoor Sensor, Building Energy Management System signal, etc) shall be provided. A high voltage terminal strip shall be provided for supply voltage.
- 4. Boiler manufacturer shall provide hot water supply temperature sensor for field installation and wiring by the contractor to connect to the boiler's controller to modulate boiler to maintain loop supply temperature.

- D. Accessories: Provide with the boiler a temperature/pressure gauge, flow switch, and factory installed ASME pressure relief valve set to relieve at 50 psi (unless indicated otherwise). Provide condensate neutralization kit for each boiler.
- E. Boiler Venting: The boiler shall be installed and vented with an exhaust venting arrangement with the combustion air drawn from the equipment room. The flue shall be Category IV Approved Stainless Steel sealed vent material as specified in Division 23"Breechings, Chimneys, And Stacks". The boiler's total exhaust venting length shall not exceed 100 equivalent feet.
- F. Manufacturers: The boiler shall be manufactured by Lochinvar, R.B.I. or Patterson-Kelly. Manufacturer shall certify that boilers will fit in available spaces prior to submitting.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
  - 1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- B. Examine mechanical space for suitable conditions where boilers will be installed. Provide access space around boilers for service. Provide no less than the minimum as recommended by the manufacturer.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 BOILER INSTALLATION

- A. Install boilers level on concrete base. Concrete base is specified in Division 23 "Common Requirements for HVAC Equipment."
- B. Install gas-fired boilers according to NFPA 54.
- C. Assemble and install boiler trim.
- D. Install electrical devices furnished with boiler but not specified to be factory mounted.
- E. Install control wiring to field-mounted electrical devices.

## 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to boiler to allow service and maintenance. Do not install piping within manufacturer's service area.

- C. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide a reducer if required. See mechanical drawings for gas type (for example, natural gas or propane gas). Do not block boiler access panels with gas pipe.
- D. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.
- E. Install piping from safety relief valves to nearest floor drain.
- F. Boiler Flue Venting: Comply with requirements in Division 23 "Breechings, Chimneys, and Stacks."
- G. Install condensate neutralization kit and connect to boiler and flue as required by boiler manufacturer, and pipe to floor drain.

## 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
  - 1. Perform installation and startup checks according to manufacturer's written instructions.
  - 2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
    - a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature.
    - b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

### 3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain boilers. Refer to Division 1 Section "Demonstration and Training."
- B. Provide factory trained representative for Owner's training as listed in Division 23 "Closeout Document Requirements for HVAC."

- C. The installing contractor shall arrange for a one-year service contract covering both labor and materials to cover the equipment. A copy of this contract must accompany the equipment submittals for engineer's approval.
- D. Provide letter from factory trained representative stating factory start-up has been performed in accordance with Division 23 "Closeout Document Requirements for HVAC."
- E. The contractor shall complete and submit a start-up form for the boiler(s) in accordance with Division 23 "Closeout Document Requirements for HVAC."

## 3.6 BOILER ASSEMBLY AND CONTROLS/INTERCONNECTIONS

A. The boiler, including the fuel train, shall be factory assembled, piped, wired, fired and tested as a complete system before leaving the factory. All controls and wiring shall be installed complete. The boilers control panel shall be provided with a terminal strip for field connection of the start signal <u>from</u> the control system (Division 23 "Instrumentation and Control for HVAC"). When energized, the factory furnished boiler controls shall fire the burner to maintain the loop water supply temperature setpoint (subject to the safety controls) as measured by the factory supplied, contractor installed temperature sensor in the loop water piping. External control wiring to boiler panel shall meet boiler manufacturer's approval.

### 3.7 STATE OF NEW JERSEY PERMITTING AND INSPECTIONS

A. Contractor shall contact the Safety Engineering Section of the New Jersey
Department of Labor and obtain a permit to install a gas-fired hot water boiler.
After installation is complete, Contractor shall contact New Jersey Department of
Labor and make arrangements for an inspection. Contractor shall pay all fees
associated with this permit and inspection. Contractor shall submit six (6) copies of
the New Jersey Department of Labor's Permit and Inspection Report to the
Architect/Engineer.

**END OF SECTION** 

#### **SECTION 23 81 20**

## PACKAGED DX -VAV ROOFTOP AIR CONDITIONING UNITS

#### 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 SCOPE

A. Provide microprocessor controlled, multiple-scroll compressor, air-cooled double-wall outdoor packaged rooftop air conditioning units, and components of the scheduled capacities and performance as shown and indicated on the drawings, including but not limited to factory-packaged rooftop air conditioner, charge of refrigerant and oil, power and control connections, and utility connections.

### 1.3 SECTION INCLUDES

- A. Packaged rooftop unit
- B. Refrigeration components
- C. Microprocessor based unit operating controls
- D. Variable speed drives
- E. Electrical power connections
- F. Startup service
- G. Provision for connection to Building Automation System (BAS) as specified

### 1.4 QUALITY ASSURANCE

- A. Packaged air-cooled condenser units shall be certified in accordance with ANSI/AHRI Standard 340/360 performance rating of commercial and industrial unitary air-conditioning and heat pump equipment.
- B. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.
- C. Unit and refrigeration system shall comply with ASHRAE 15, Safety Standard for Mechanical Refrigeration.
- D. Unit Energy Efficiency Ratio (EER) shall be equal to or greater that prescribed by ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.

E. Unit shall be safety certified by ETL and ETL US listed. Unit nameplate shall include the ETL/ETL Canada label.

### 1.5 WARRANTY

A. Warranty: Manufacturer shall warrant all equipment and material of its manufacture against defects as specified in Section 23 05 14.

### 1.6 DELIVERY AND HANDLING

- A. Unit shall be delivered to the job site fully assembled, wired, and charged with refrigerant and oil by the manufacturer. Unit shall be shipped with doors screwed shut and outside air hood closed to prevent damage during transport and while awaiting installation.
- B. Unit shall be stored and handled per Manufacturer's instructions.
- C. All handling and storage procedures shall be per manufacturer's recommendations.

# 1.7 REGULATORY REQUIREMENTS

A. Unit shall conform to ANSI/UL 465 for construction of packaged air conditioner. Unit <u>net</u> capacities shall be as scheduled when tested in accordance with ARI-210 at the scheduled entering air conditions.

#### 1.8 SUBMITTALS

- A. Shop drawing submittals shall include, but not limited to, the following: drawings indicating components, dimensions, weights, required clearances, and location, type and size of field connections, and power and control wiring connections. See also section 23 05 13 for requirements.
- B. Product data shall include dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, and gauges and finishes of materials. All cooling and heating capacities shall be provided as net capacities and take into account heat gain from all motors in the air stream.
  - 1. Fan curves with specified operating point clearly plotted shall be provided.
  - 2. Product data of filter media, filter performance data, filter assembly, and filter frames shall be provided.
  - 3. Electrical requirements for power supply wiring; including wiring diagrams for interlock and control wiring shall be supplied. Factory and field-installed wiring shall be clearly indicated.

## 1.9 MANUFACTURERS:

A. Manufacturers: DX VAV rooftop air conditioning units shall be manufactured by Trane.

#### PART 2 - PRODUCTS

## 2.1 PRODUCT DESCRIPTION

#### A. General:

- 1. Packaged rooftop unit shall include compressors, evaporator coils, filters, supply fans, relief fans, dampers, air-cooled condenser coils, condenser fans, natural gas heaters, and unit controls.
- 2. Unit shall be factory assembled and tested including leak testing of the DX coils, pressure testing of the refrigeration circuit, 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 refrigeration system components and 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. Cabinet: Galvanized steel, phosphatized, and finished with a pre-applied baked polyurethane enamel. Cabinet surface shall be tested 672 hours in salt spray in compliance with ASTM B117. Fully gasketed removable access panels. Structural members shall be heavy gauge with access doors and removable panels of heavy gauge. Provide 1/2 inch thick foil faced fiberglass insulation on all exterior panels and roof in contact with the return and conditioned air stream. Cabinet top cover shall be one piece construction or where seams exits, it shall be double hemmed and gasket sealed.
- 2. Access Doors: Fully-gasketed hinged doors with hold-back apparatus shall provide access to filters, supply air fan section, evaporator coil section, and unit control section.
- 3. 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.

- 4. Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.
- 5. Access to filters, dampers, cooling coils, heaters, compressors, 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.
- 6. 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.
- 7. Units with cooling coils shall include double sloped 304 stainless steel drain pans and condensate switch.
- 8. 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.
- 9. Unit shall include lifting lugs on the top of the unit.
- 10. Unit base shall be fabricated of 1-inch thick double wall, impact resistant, rigid polyurethane foam panels.

# C. Electrical Power Connections:

- 1. Factory-made penetrations shall be provided for connection of all electrical wiring. These wiring provisions shall be through the knock-out on side of unit. Field penetrations of the unit base pan shall not be acceptable.
- 2. Provide a factory-installed non-fused disconnect switch which satisfies NEC requirements for a service disconnect switch. Disconnect handle shall be accessible through the control box door such that high voltage power must be off before door can be opened.
- 3. Provide a factory-installed factory-powered 15A 115V convenience outlet capable of ground fault protection.
- 4. Unit shall include a phase monitor as standard that protects equipment from phase loss, phase reversal, and low voltage. Any fault condition shall produce a Failure Indicator LED, and send the unit into an emergency stop condition. The entire unit with this option shall be cULus approved. If not, a field UL inspection is required.
- 5. Unit shall include a High Fault Unit Interrupt Rating (Short Circuit Current Rating-SCCR). 65,000 Amp rating shall be applied to the unit enclosure using a non-fused circuit breaker for disconnect switch purposes. Fan motors, compressors, and electric heat circuits shall be provided with series rated circuit breakers that will provide the unit rated level of protection. The unit shall be marked with approved cULus markings and will adhere to cULus regulations.

# D. Supply Fans:

- 1. Provide forward-curved fan mounted with fixed pitch sheave drive assembly. Complete fans assemblies shall be statically and dynamically balanced.
- 2. Fan shaft shall be mounted on grease lubricated ball bearings.
- 3. All motors shall be circuit breaker protected.
- 4. Provide EISA rated motors for supply and exhaust fans.
- 5. Provide Internal Shaft Grounding Ring. Motors shall have internal bearing protection for use with VFDs.

- 6. Blowers and motors shall be dynamically balance and mounted on rubber isolators.
- 7. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
- 8. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.
- 9. Supply fan motors shall be open drip-proof. All supply fans shall be dynamically balanced in factory. Each motor shall have its own Variable Frequency Drive. Supply fan shall be test run in unit and shall reach rated rpm. All 60 Hz supply fan motors shall meet the Energy Independence Security Act of 2007 (EISA).
- 10. Supply fan bypass control shall provide airflow at 60 Hz in the event of drive failure.

## E. Exhaust/Return Section:

- 1. Economizer shall be factory installed. The assembly shall include fully modulating 0-100 percent motor and dampers, minimum position setting(s), preset linkage, wiring harness, and solid state temperature control.
- 2. Unit shall be provided with modulating 100% Exhaust Fan with Comparative Building (Statitrac) Control. The differential pressure control system shall use a differential pressure transducer to compare indoor building pressure to outdoor ambient atmospheric pressure and shall turn the exhaust fans on and off and modulate the barometric exhaust dampers to control the building pressure to within the adjustable, specified dead band that shall be adjustable at the RTU control board.
- 3. Provide an Ultra-Low Leak exhaust damper with airfoil blades and independent direct drive actuator. Damper shall have a leakage rate of 3 CFM/square-ft at 1.0 in WC pressure differential (AMCA Class 1A). Damper shall have a functional life of 60,000 opening & closing cycles. (Note: Based on testing completed in accordance with AMCA Standard 500D.)

# F. Evaporator Coils

- 1. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
- 2. Provide heavy duty aluminum fins mechanically bonded to internally enhanced, copper tubes.
- 3. Provide a thermostatic expansion valve for each refrigeration circuit. All coils shall be leak tested at the factory to ensure pressure integrity. The evaporator coil is pressure tested to 450 psig.
- 4. Unit shall include a Condensate Overflow Switch to shut the unit down in the event that a clogged condensate drain line prevents proper condensate removal from the unit.
- 5. Unit shall include sloped evaporator stainless steel coil drain pans that are durable, long-lasting and highly corrosion resistant.

6.

# G. 5-Stage Refrigeration System

- 1. Unit shall be designed for use with R410A refrigerant.
- 2. Compressor(s) shall be manufactured by manufacturer of rooftop unit.

- 3. Compressor: Hermetic compliant scroll compressor operating at 3600 rpm with isolated mounting, centrifugal oil pump, oil sight glass, and suction and discharge service valves on each circuit.
- 4. Provide five stages of mechanical cooling with the ability to be at or below 25% compressor displacement at stage one. Achieving this through Hot Gas Bypass shall be unacceptable.
  - a. In lieu of 5 stages, a variable speed compressor may be utilized. Single compressors and digital compressors are NOT allowed.
- 5. Provide factory installed service valves which include suction, liquid, and discharge 3-way shutoff valves.
- 6. Provide with thermostatic temperature motor winding control for protection against excessive temperatures caused by over-/undervoltage operation or loss of charge. Also provide high and low pressure cutouts.
- 7. Provide integral coil frost protection based on refrigerant circuit suction temperature to prevent coil frosting with minimum energy usage for all units. Hot Gas Bypass shall not be acceptable.
- 8. Units shall have cooling capabilities down to 0 degree F as standard or manufacturer shall furnish unit with installed low ambient controls to allow for operation down to 0 degree F. For field installed low ambient accessory, the manufacturer shall provide a factory authorized serviceman that will assure proper installation and operation.
- H. Pressure Transducer: Stainless steel pressure transducer shall provide accurate measurement of high and low side refrigeration system pressure over the entire operating range. System pressures and saturation temperatures shall be displayed at the user interface to improve field diagnostics. The transducer is accessible as it shall be located close to the compressor manifold set. Durable weatherproof automotive grade electrical connectors shall be used to ensure reliability.

#### I. Air-Cooled Condenser

- 1. Provide all Aluminum Microchannel condenser coils. All condenser coils shall be leak tested at the factory to ensure pressure integrity and pressure tested to 650 psig.
- 2. Provide integral subcooling circuit(s) to prevent premature refrigerant flashing and to insure maximum operating efficiency.
- 3. Provide vertical discharge, direct drive fans with steel blades, and three phase motors. Fans shall be statically balanced. Motors shall be permanently lubricated, with built-in current and thermal overload protection in a weathertight casing.
- 4. Furnish unit with factory installed low ambient capability to allow for operation down to 0 F. Hot Gas Bypass shall not be acceptable
- 5. Provide tool-less factory installed corrosion resistant louvered hail/vandalism guards to protect condenser coils from hail or physical damage. Wire mesh coil guards shall not be acceptable.
- 6. Provide Corrosion Protected Condenser Coil that includes an all aluminum microchannel condenser coil with a corrosion resistant coating that shall withstand ASTM B117 Salt Spray test for 6,000 hours and ASTM G85 A2 Cyclic Acidified Salt Fog test for 2,400 hours. This coating shall be added after coil construction covering all tubes, headers and fin edges, therefore providing optimum protection in more corrosive environments.

# J. Natural Gas Heating

- Completely assembled and factory-installed heating system shall be integral
  to unit, cULus approved specifically for outdoor applications for use
  downstream from refrigerant cooling coils. Threaded connection with plug
  or cap provided. Provide capability for gas piping connection through side
  of unit.
- 2. Heating section shall be factory run tested prior to shipment.
- 3. Gas Burner shall be forced combustion type power burner, negative pressure gas valve, manual shut-off, hot surface ignition, and flame sensing safety control.
- 4. Gas Burner Safety Controls: Provide safety controls for the proving of combustion air prior to ignition, and continuous flame supervision. Upon a failure to ignite, three attempts of ignition will occur before lockout of the ignition system.
- 5. Combustion blower shall be centrifugal type fan with built-in thermal overload protection on fan motor.
- 6. Heat Exchanger: Provide drum and tube heat exchanger of free floating design manufactured from 14-gauge 304 stainless steel drum and 16-gauge 304 stainless steel tubes. Factory pressure and leak tested.
- 7. Limit controls: High temperature limit controls will shut off gas flow in the event of excessive temperatures resulting from restricted indoor airflow or loss of indoor airflow.
- 8. Modulating Gas Heaters shall be made from grades of stainless steel suitable for condensing situations. The heater shall have a turn down ratio of at least (2.5 to 1).

# K. Filters

- 1. Pre-Evaporator Coil Filter MERV 8 Panel: Filters shall be 2-inch thick, MERV 8 disposable synthetic media, and shall slide into an extruded aluminum rack.
- 2. Filter Monitoring Differential Pressure Transducer: A factory-installed, differential pressure transducer shall be piped to both sides of the pre evaporator filter to indicate status. Transducer shall maintain a +/- 5 percent accuracy within operating temperature limits of -20°F to 120°F. Transducer shall be mounted in a unit control box and report status through unit control display.

## L. 0-100% Modulating Economizer

- Provide a fully integrated factory installed 100% modulating outside air economizer with unit return and barometric relief air dampers. Economizer operation shall be through microprocessor based primary temperature controls that automatically modulate dampers to maintain space temperature conditions.
  - a. Provide economizer with dry bulb temperature control.
  - b. Provide adjustable minimum position control located in the unit control box.
  - c. Provide spring return motor for outside air damper closure during unit shutdown or power interruption.
  - d. Provide Outside Air Measurement (Traq). A factory mounted airflow measurement station (Traq) shall be provided in the outside air opening to measure airflow. The airflow measurement station

shall measure from 40 cfm/ton maximum airflow. The airflow measurement station shall adjust for temperature variations. Measurement accuracy shall meet requirements of LEED IE Q Credit 1 as defined by ASHRAE 62.1-2007.

M. Low-Leak Economizer Damper: Provide Ultra Low Leak Economizer Dampers. The return air and fresh air dampers shall be provided with airfoil blades and independent direct drive actuators. Dampers shall have a leakage rate of 3 CFM/sq-ft at 1.0 in WC pressure differential(AMCA Class 1A). Dampers shall have a functional life of 60,000 opening & closing cycles. (Note: Based on testing completed in accordance with AMCA Standard 500D.)

## N. Controls

- 1. General: Microprocessor controls shall be provided for all 24 volt control functions. The resident control algorithms shall make all heating, cooling and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from set point and provides better building comfort. A centralized microprocessor shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.
- Variable Air Volume controls with Variable Frequency Drive: Provide variable air volume supply air temperature control with variable frequency drive with bypass control to provide full nominal air flow in the event of drive failure. Provide all necessary controls to operate a VAV rooftop from supply air temperature including microprocessor controller and supply air sensor. The microprocessor shall coordinate the economizer control and stages of cooling with supply air temperature reset capability based upon outdoor air temperature. Variable frequency drive shall be factory installed and tested to provide supply fan motor speed modulation based upon the supply air static pressure setpoint. Field installed variable frequency drives shall not be acceptable.
  - a. The following setpoints shall be accessible in the unit control panel: supply air cooling setpoint, morning warmup setpoint, reset setpoint, reset amount, static pressure setpoint, and static pressure deadband.
  - b. Compensated Outside Air Control shall be provided to control outside air damper positioning, maintaining minimum outside air requirements, during operation of variable air volume (VAV) systems.
- 3. Clogged filter indication: Provide factory installed differential pressure switch to indicate filter replacement status. Differential pressure switch shall cause a contact closure to display a service indication and unit will continue to operate normally.
- 4. Fan Failure indication: Provide a factory installed dedicated differential pressure switch to achieve active fan failure indication.
  - a. C/T sensing of the fan motor is not allowed.
- 5. Discharge Air Temperature Sensing: Provide a factory installed discharge air temperature sensor. This sensor shall provide a status indicator readable through the BAS.

- 6. Condensate Drain Pan Overflow Switch: Provide a factory installed condensate overflow switch to shut the unit down in the event that the condensate drain line becomes clogged.
- 7. Provide Outside Air Measurement (Traq or Ruskin). A factory mounted airflow measurement station shall be provided in the outside air opening to measure airflow. The airflow measurement station shall measure from 40 cfm/ton maximum airflow. The airflow measurement station shall adjust for temperature variations. Measurement accuracy shall meet requirements of LEED IE Q Credit 1 as defined by ASHRAE 62.1-2007.
- O. Accessories: 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.

## 2.2 ROOF CURB

- A. Contractor shall provide factory supplied, vibration isolation roof curb.
- B. Curb shall extend above highest portion of finished roof, with integral spring rail. Springs shall allow for 2" deflection. Curb shall be Thybar Vibro Curb III, or approved equal.
- C. Prefabricated Vibration isolation curb shall be manufactured of prime galvanized steel construction, 18 or 14 gauge as required, meeting ASTM A653/653M, with welded corners and with seams joined by continuous water and air tight welds. Vibration isolation curb shall be internally reinforced with bulkheads 48" on center and factory installed wood nailer. Top of all Vibration isolation curb shall be level, with pitch built into curb when deck slopes.
- D. Vibration isolation curb shall be designed to provide a minimum of 90% isolation efficiency with 1" deflection. 9" continuous rubber cover around perimeter of Vibration isolation curb over spring isolators.
- E. Flexible counter flashing shall be provided for a weather tight seal and easy access to the isolation springs. Isolators shall be sized and spaced to accommodate the rooftop weight and center of gravity for a minimum of 90% isolation efficiency.
- F. Curb shall be manufactured in accordance with the National Roofing Contractors Association guidelines.

# 2.3 SPECIAL REQUIREMENTS FOR RTU-1

- A. Many additional features not described in this specification are included on the drawings in the Rooftop Air Conditioner Schedule for RTU-1. See drawings for special features for RTU-1.
  - 1. Phase monitor shall protect 3-phase equipment from phase loss, phase reversal and phase imbalance. Any fault condition shall produce a Failure Indicator LED and send the unit into an auto stop condition.
  - 2. An external handle mounted on the control box door shall be provided to disconnect unit power with the control box door closed for safety.

3. A 15A, 115V Ground Fault Interrupter convenience outlet shall be factory installed. It shall be wired and powered from a factory mounted transformer. Unit-mounted, non-fused disconnect with external handle shall be furnished with factory powered outlet.

## 2.4 ACCESSORIES

- A. Provide the units with:
- B. 5 stages of cooling
- C. Low ambient cooling down to 0F
- D. Modulating gas heat
- E. 304 Stainless steel heat exchanger
- F. Multi Zone VAV configuration with discharge air control
- G. Dry bulb temperature control economizer with ultra-low leak dampers
- H. Discharge air sensor
- I. Dirty Filter Sensor
- J. Fan failure sensor
- K. Condensate Overflow sensor in the drain pan
- L. OA airflow measuring device
- M. Power exhaust with comparative building pressure control
- N. MERV 8 filters
- O. BACnet MS/TP interface
- P. Phase monitor
- Q. Powered GFI convenience outlet
- R. 65K amp SCCR rating
- S. Vibration isolation curb

## PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Verify that proper power supply is available.

#### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route utilities thru roof mounting curb adapter providing watertight enclosure to protect ductwork and utility services (electrical power and control) constructed in accordance with section 23 05 29.
- C. Install units level and plumb, maintaining manufacturer's recommended clearances.

# 3.3 MANUFACTURER'S FIELD SERVICE

- A. Manufacturer shall furnish a factory trained service technician, employed by the manufacturer, to start the unit(s) as required in the start-up, operation and maintenance manuals provided by the manufacturer. Technician shall inspect and approve all field provided piping, electrical power wiring, control wiring, etc. Owner's control contractor must be present at the time of the start-up to verify interface with DDC control system.
- B. A start-up report shall be furnished by the authorized service technician to document the unit's start-up and shall be signed by the Owner's representative.

# 3.4 TESTING

A. Factory Test: The refrigerant circuit shall be pressure-tested, evacuated and fully charged with refrigerant and oil. The refrigerant circuit shall undergo a factory helium leak test and undergo an automated operational run test and quality inspection prior to shipment. The unit controller shall be configured and run tested at the factory to minimize field setup time. Provide field start up and testing to ensure that the controller is functioning properly.

# COMMON WORK RESULTS FOR ELECTRICAL

#### 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. Basic electrical requirements, which are specifically applicable to all Division 26 Sections, in addition to the requirements of Division 1 - General Requirements.

#### 1.3 SUBMITTALS

- A. Provide submittals in accordance with Section 01 33 00 Submittal Procedures.
- B. Submittal data containing manufacturer's data shall be sent to the Architect, Engineer and Owner for review.
- C. Electronic submittal data shall be assembled in Adobe Acrobat's Portable Data Format (PDF) for review.
- D. Electronic submittal data shall be assembled in one (1) <u>complete</u> PDF file and shall include an index sheet (TOC) listing each submittal item by specification number and its content. Each file shall also be organized with "Bookmarks" of each section. Submittals that do not have each submittal item referenced by "Bookmarks" shall be rejected.
- E. All electronic submittal data for a trade shall be submitted at <u>one time</u> except as noted herein.
- F. Data not submitted shall have a statement explaining why the data was not submitted.
- G. Submittals not conforming to any of the above requirements shall be rejected.
- H. The contractor shall go to each specification section to determine all technical information/data required and organize information/data using tabs for major headings as follows:
  - 1. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables
    - a. Building wire and cable (600 volts and less)
    - b. Connectors, splices and terminations (600 volts and less)
  - 2. Section 26 05 29 Hangers and Supports for Electrical Systems
    - a. Steel slotted support systems
    - b. Fastening hardware

- c. Plywood backboards
- 3. Section 26 05 33 Raceways and Boxes for Electrical Systems
  - a. Rigid steel conduit
  - b. IMC
  - c. EMT
  - d. Flexible metal conduit
  - e. Liquidtight flexible metal conduit
  - f. Conduit fittings and bodies
  - g. Junction boxes
- 4. Section 26 05 53– Identification for Electrical Systems
  - a. Product Data
  - b. Identification Schedule
  - c. Samples
- 5. Section 26 28 13 Fuses
  - a. Product data
  - b. Shop drawings
- 6. Section 26 28 16 Enclosed Switches and Circuit Breakers
  - a. Product data
  - b. Shop drawings
- I. Manufacturer's data sheets shall be marked to clearly indicate the manufacturer, model number, size, color, accessories, required clearances, field connection details, weight loading, electrical characteristics, capacities, etc. being submitted. Variations from specifications shall be explained. Submittal preparer's name and telephone number shall be listed on the index sheet.
- J. Only manufacturer's listed in specifications or addendums will be considered.
- K. Review, corrections, or comments made on the submittals do not relieve the Contractor from compliance with the requirements of the Drawings, Specifications and Addendums (Contract Documents). By entering into this Contract, the Contractor agrees that the purpose of submittals is to demonstrate to the Engineer that the Contractor understands the design concept and that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and use. Review of shop drawing will be general only for basic conformance with the design concept. The review of such drawings, schedules or cuts shall not relieve the Contractor from the responsibility for correcting all errors of any sort contained in the submittals. The Contractor is responsible for confirming and correlating all quantities and dimensions; selecting proper fabrication processes, construction methods and installation techniques; coordinating this work with that of all other trades; and performing all work in a safe, workmanlike and satisfactory manner.
- L. Below are the submittal item codes that will be used when reviewing the submittal data. These codes show up on the "Submittal Review" sheet. Only one copy of the submittal review sheet is returned upon completion of the submittal review.
  - 1. RNE Reviewed, No Exceptions Noted
    - a. Indicates the information provided has been reviewed and no exceptions are taken. Contractor must still comply with the contract documents.
    - b. No corrective action required at this time.

- 2. FNC Furnish with Noted Corrections
  - Indicates the contractor shall insure that all necessary or noted corrections are incorporated into equipment furnished to the project.
  - b. Contractor shall incorporate items requested in review comments, but re-submittal not required.
- 3. RES Revise and Resubmit
  - a. Indicates item is not presently acceptable as submitted, but may be accepted provided additional information and/or changes are made.
  - b. Contractor shall revise and resubmit item to Engineer with additional information indicating compliance with Contract Documents prior to proceeding with work.
- 4. PSD Provide Submittal Data
  - a. Indicates submittal data was not provided for this item or section.
  - b. Contractor shall provide submittal data meeting the explicit requirements of the plans, specifications, and all addenda.
- M. Shop drawings and data submittals for materials requiring extra long delivery time shall be submitted for approval as soon as possible after execution of contract. All sleeves must be precast in concrete or concrete block and accordingly provided to the mason in a timely manner. Accordingly, all items such as these shall be submitted for approval in a timely manner (prior to other submittals if necessary) so they may be properly incorporated in the building's structure. Allow a minimum of three weeks for review. No substitutions of materials or extensions of contract time will be allowed for Contractors failure to submit or order such materials sufficiently in advance of the work. See Architectural specification section for additional requirements for submittals.

# 1.4 REGULATORY REQUIREMENTS

- A. All work installed under Division 26 shall conform to the current adopted Edition of Building/Electrical Codes and their appropriate amendments:
  - 1. NFPA 70 2017 National Electrical Code
  - 2. Life Safety Code, NFPA 101
  - 3. Energy Code: ASHRAE 90.1 2016
  - 4. International Building Code (2018)
  - 5. International Mechanical Code (2018)
  - 6. Galloway Township/Atlantic County, New Jersey Codes
- B. Obtain and pay for all permits, and request inspections from all authorities having jurisdiction, in a timely manner.
- C. Materials and Equipment included in Underwriter's Label Service shall bear that label. Electrical equipment shall be UL approved as installed, and bear the UL label, unless noted otherwise herein.
- D. Where requirements of these specifications differ from specified codes and ordinances, conform to the more stringent requirements.

#### 1.5 CONTRACTOR GUARANTEE

A. All equipment and materials furnished and all work performed under these specifications, shall be guaranteed to be free of defective materials and workmanship for a period of one year (unless a longer period is specified elsewhere) after Architect's Final Certificate. Upon notice of failure of any part of the guaranteed equipment during the guarantee period, the affected part or parts shall be promptly replaced with new parts by the Contractor at no additional cost to the Owner. All labor required to perform guarantee shall be included as part of the complete guarantee warranty.

# 1.6 OPERATING AND MAINTENANCE (O&M) MANUALS

- A. Three bound and indexed Operating and Maintenance Manuals shall be prepared by the Contractor and be submitted for approval prior to delivery to operating personnel. Binders shall be 3-ring commercial grade, complete with inside storage pockets, sheet protectors, spine and front cover labels.
- B. Operating and maintenance manuals shall also comply with Division 1 Section "Operation and Maintenance Data.

# 1.7 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on Drawings, unless prevented by project conditions. Shift or relocate equipment or systems to avoid conflicts with other trades. Modifications to the work required to accommodate project conditions encountered in the field shall be made at no additional cost to the contract.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding.
- C. Install items so that there are no obstructions (e.g., pipes, conduits, etc.) blocking service panels of the equipment, or preventing the removal of the equipment.
- D. Electrical items are shown on drawings in approximate locations unless dimensioned. Install at location required to serve intended purpose. Include installation within ten (10) feet of location shown.

# 1.8 SEQUENCING AND SCHEDULING

- A. Contractor shall coordinate work so as to avoid conflicts with other work in progress.
- B. Work shall progress in a manner that will not interfere with other trades. The Division 26 Contractor shall have coordination meetings with all other Contractors to ensure that all systems installed in "share areas" (e.g. ceiling plenums, mechanical rooms, etc.) are coordinated and installed to insure proper fit and access. All costs required for the coordination of the work between trades shall be borne solely by the Contractor.

C. Contractor shall provide confirmation letters from the factory (not from the contractor) to the Owner that long lead items have been ordered. Long lead items are defined as items having longer than six week fabrication schedules. See Section 01100 - Summary for additional requirements.

## 1.9 ACCEPTABLE PRODUCTS

- A. Where a manufacturer has been listed as being acceptable in the various specification sections hereinafter for a certain product, it shall be understood that the manufacturer has been approved as being capable of producing this product. This does not necessarily constitute approval of his standard product. His product shall still comply with all of the requirements and standards of this specification and not necessarily his standard specification, to the extent that it might require special manufacture to meet the requirement and standards of this specification.
- B. Prior Approval: Substitutions of specified items and prior approvals of other manufacturers will not be considered.
- C. Addenda: If the substitution is allowed, such approval will be set forth in an Addendum.
- D. Costs: All costs incurred by the acceptance of substitutions shall be borne by the contractor.

#### 1.10 DRAWINGS

- A. General: Both the drawings and specifications shall be considered supplemental to one another so that materials and labor required by one but not the other shall be supplied and installed as though specifically called for by both. Where drawings and specification conflict, Contractor shall conform to the more stringent or costly of the two requirements.
- B. Scaling: The drawings are diagrammatic only and show generally the location of the equipment, ducts and pipes but are not to be scaled. All dimensions shall be verified at the building site. Prefabrication of work from the drawings shall be at the Contractor's risk.
- C. Existing Conditions: It shall be the Contractor's responsibility to visit the site prior to bidding the project and prior to beginning work to make himself familiar with existing conditions.

## 1.11 PROTECTION OF MATERIALS AND EQUIPMENT

- A. Delivery, Storage and Handling: Deliver products to site in factory-fabricated protective containers, with (where appropriate) factory-installed shipping skids and lifting lugs. Store in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
- B. Prior to Final Construction Review: All materials and equipment shall be cleaned. Chipped or scraped paint shall be retouched to match.

C. Equipment Painting: Equipment which has been damaged beyond the point of retouching or has been retouched not to match the original finish shall be repainted in accordance with the Architectural painting section.

## 1.12 CLEANING

- A. The Contractor shall maintain the site reasonably clean and free of excessive debris and leftover materials at all times. All trash and debris shall be hauled from the job site on a daily basis for disposal. Prior to testing and adjusting, equipment shall be clean and free of any construction debris and litter.
- B. Contractor shall meet all contractual requirements as related to site cleanliness including dust control.

# 1.13 ROOM NUMBERS

A. The room numbers indicated on the Contract Documents were provided by the Architect to assist in identifying spaces during construction. These room numbers may not necessarily be the Owner's final choice of room numbers. The contractor shall obtain from the Owner the final choice of room numbers, and shall use these numbers wherever required. (For example, room numbers are used in programming of fire alarm systems and intercom system, and shall match the Owner's final choice.)

# 1.14 CONTRACTOR REQUESTS FOR ELECTRONIC COPIES OF CAD DRAWINGS

- A. If the Contractor requests to obtain electronic copies (emailed files or disc files) of CAD drawings from Andrews, Hammock & Powell, Inc., (AH&P) this paragraph shall describe the conditions for this action to take place.
  - 1. The Contractor must obtain written permission from the Architectural client, that the Architect does not object to providing electronic copies when AH&P is hired by an Architect to perform Engineering services.
  - 2. If AH&P is prime party (i.e. not hired by an Architect, but hired by the client directly), Contractor must obtain permission of AH&P to obtain electronic copies.
  - 3. If approval by Architect or Engineer (as noted above) is obtained, Contractor may obtain electronic copies based on the following rates: \$25 per sheet, with minimum \$200 per project.
  - 4. Contractor shall mail a copy of the check to AH&P, payable to AH&P and shall sign the enclosed indemnification letter, and send this letter to AH&P, along with requested sheets. If time is of essence, a copy of the check and indemnification may be faxed as evidence of the Contractor's intent to mail said documents.
  - 5. Upon receiving the check or faxed copy, and signed indemnification letter, electronic copies of requested sheets shall be provided. AH&P reserves the right to alter the electronic copies by removing Professional Engineering Stamp, title block information, company logo, and similar information that is not relevant to the Contractor's needs. Contractor shall indicate the desired format for CAD drawings (DWG or DGN).

Macon,	GA 31210
Re:	Letter of Indemnification
	(Project Name)
Gentler	men:
supplie harmles consult to attor misinte data pr to any u	is and indemnify Andrews, Hammock and Powell, Inc. and the project architect and the ants from and against all claims, liabilities, losses, damages and costs including but not limited mey's fees, arising out of or in any way connected with the use of, modification of, rpretation of, misuse of, or reuse by others of computer aided design (CAD) information and ovided on the above referenced project. The foregoing information applies, without limitation, use of the project information on this project, other projects, for additions to this project, or for inges to this project by others.
nature	(company name) also reledges that the drawings prepared by Andrews, Hammock and Powell, Inc. is schematic in and is not intended as a shop drawing, dimensional drawing or fabrication drawing. Any ional information extracted from the CAD data by
risk.	(company name) is done purely at their own
	(company name) agrees to ensure
	y use of the above referenced CAD information without the expressed written authorization for er projects other than referenced project is hereby prohibited.
Signing	on behalf of(company name),
Signatu	re
Print Na	ame

Andrews, Hammock and Powell, Inc.

250 Charter Lane

Date

# ELECTRICAL DEMOLITION FOR REMODELING

#### 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 SECTION INCLUDES

- A. Demolition of existing facilities shall consist of, but is not limited to, the removal of cable and wiring, conduit, fixtures and outlets, and associated abandoned or removed equipment.
- B. Visual Appearance: Demolition shall be accomplished so as to not degrade the visual appearance and structural soundness of the facility.
- C. Surfaces exposed by the removal of equipment and equipment connections shall be restored to match existing adjacent surfaces.

#### PART 2 - PRODUCTS

# 2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

## **PART 3 - EXECUTION**

# 3.1 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on Drawings.
- B. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Engineer before disturbing existing installation.
- C. Beginning of demolition means installer accepts existing conditions.

## 3.2 PREPARATION

- A. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- B. Existing Electrical Services: Maintain existing systems in service during construction. Disable systems only to make connections. Obtain permission from Owner at least 14 days before partially or completely disabling any existing system. Minimize outage duration.

# 3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work under provisions of this Section.
- B. Remove, relocate, and extend existing installations to accommodate construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Repair adjacent construction and finishes damaged during demolition and extension work.
- F. Maintain access to existing electrical installations which remain active.
- G. Extend existing installations using materials and methods as specified.
- H. If circuit serves only the device or equipment to be removed, then remove conductors back to supplying panel and remove all accessible conduit.
- I. If circuit serves some devices or equipment to be removed and some devices or equipment to remain, remove conductors back to nearest junction box or equipment to remain and rework remaining conductors to maintain power to devices to remain. Remove accessible conduit to same box or equipment. Plug all openings in box or equipment.

# LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.

# 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

# 1.4 QUALITY ASSURANCE

A. Comply with NFPA 70.

# 1.5 COORDINATION

- A. Determine required separation between this and other work.
- B. Determine routing to avoid interference with other work.

# PART 2 - PRODUCTS

## 2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Only products of domestic manufacturer will be accepted.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. American Insulated Wire Corp.; a Leviton Company.
  - 2. General Cable Corporation.
  - 3. Senator Wire & Cable Company.
  - 4. Southwire Company.
  - 5. Allied
  - 6. Carol.
  - 7. Pirelli.

- 8. Rome.
- 9. Triangle.
- C. Copper Conductors: Comply with NEMA WC 70.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.

## 2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. 3M; Electrical Products Division.
  - 2. Burndy Hydent.
  - 3. Ilsco.
  - 4. Thomas and Betts.
  - 5. Ideal.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
  - 1. Solderless Pressure Connectors: 3M Skotch-loks, T & B Freespring, or Ideal Wing Nut for 10 AWG and smaller.
  - 2. Compression Connectors: Burndy Hydent, Ilsco or Thomas and Betts, Color-Keyed for 8 AWG and larger.
  - 3. Terminal Lugs: Thomas and Betts STA-KON for 10 AWG and smaller; Thomas and Betts Color-Keyed for 8 AWG and larger. Equal product as manufactured by Burndy or Ilsco are acceptable.

# PART 3 - EXECUTION

# 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

# 3.2 CONDUCTOR INSULATION APPLICATIONS AND WIRING METHODS

- A. Exposed Circuits: Type THHN-THWN, single conductors in raceway,
- B. Circuits Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.
- C. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- D. Class 2 Control Circuits: Type THHN-THWN, in raceway.

E. Insulation: ANSI/NFPA 70; Type XHHW insulation for circuits 6AWG and larger; Type THHN/THWN insulation for circuits 8 AWG and smaller. At the contractor's option, type THHN/THWN insulation may be utilized throughout for all feeders and branch circuits.

#### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Identify and color-code conductors and cables according to Division 26 Section "Electrical Identification."
- E. Install products in accordance with manufacturers' instructions.
- F. Use conductor not smaller than 12 AWG for power and lighting circuits.
- G. Pull all conductors into raceway at same time.
- H. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- I. Neatly train and lace wiring inside boxes, equipment, and panelboards using nylon cable ties by Thomas and Betts, Panduit or Ideal.

# 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Clean conductor surfaces before installing lugs and connectors.
- D. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- E. Where compression connectors are used for conductor splices and taps; tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

F. Use terminal lugs for connecting all stranded conductors and for all multiple connections to terminals.

# 3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 7 Section "Through-Penetration Firestop Systems."

# 3.6 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
    - a. Verify continuity of each branch circuit.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Remove and replace malfunctioning units and retest as specified above.

# GROUNDING AND BONDING FOR ELECTRICAL 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.

## 1.2 SUMMARY

A. Electrical equipment and raceway grounding and bonding.

## 1.3 OUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

# PART 2 - PRODUCTS

#### 2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

# 2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

## **PART 3 - EXECUTION**

## 3.1 APPLICATIONS

- A. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, and receptacle ground connections.
- B. Provide a separate grounding conductor in all conduits, no exceptions. Connect outlet boxes to grounding conductors with screw fastened bonding jumper.
- C. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger, unless otherwise indicated.

#### FIELD QUALITY CONTROL 3.2

Inspect grounding and bonding system conductors and connections for tightness and A. proper installation.

# HANGERS AND SUPPORTS FOR ELECTRICAL 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.

# 1.2 SUMMARY

- A. Conduit and equipment supports.
- B. Fastening hardware.
- C. Plywood backboards.

## 1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

# 1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

# 1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Steel slotted metallic support systems.
  - 2. Fastening hardware.
  - 3. Plywood backboards.
- B. Indicate hanger and support framing and attachment methods.

# 1.6 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

## 1.7 COORDINATION

A. Coordinate with Division 23 contractor to route conduit concealed within curb of rooftop mounted HVAC equipment.

## PART 2 - PRODUCTS

# 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cooper B-Line, Inc.; a division of Cooper Industries.
    - b. ERICO International Corporation.
    - c. GS Metals Corp.
    - d. Thomas & Betts Corporation.
    - e. Unistrut; Tyco International, Ltd.
  - 3. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  - 1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
      - 2) Empire Tool and Manufacturing Co., Inc.
      - 3) Hilti Inc.
      - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      - 5) MKT Fastening, LLC.
  - 2. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  - 3. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
  - 4. Toggle Bolts: All-steel springhead type.
  - 5. Hanger Rods: Threaded steel.

- F. Plywood: Exterior glue, type AC.
- G. Do not use powder-actuated anchors.

## **PART 3 - EXECUTION**

#### 3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 3/8inch in diameter.
- C. Multiple Raceways: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
- D. Secure raceways and cables to these supports with two-bolt conduit clamps.
- E. Provide 3/4 inch plywood backboards with angle iron frame for all surface mounted equipment and as noted or specified.

# 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Light Steel: Sheet metal screws.
  - 5. Items Mounted on Hollow Walls and Nonstructural Building Surfaces:
    Mount cabinets, panelboards, disconnect switches, control enclosures, pull
    and junction boxes, transformers, and other devices on slotted-channel racks
    attached to substrate.

E. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

# 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Fabricate supports from structural steel or steel channel, rigidly bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts or double nuts jammed tight.

# 3.4 PAINTING

- A. Touchup: Clean abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

# RACEWAY AND BOXES FOR ELECTRICAL 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.

## 1.2 SUMMARY

- A. This Section includes raceways, fittings and boxes for electrical wiring.
- B. Related Sections include the following:
  - 1. Section 26 05 26 Grounding and Bonding
  - 2. Section 26 05 29 Hangers and Supports

#### 1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. RNC: Rigid nonmetallic conduit.

# 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

#### PART 2 - PRODUCTS

## 2.1 METAL CONDUIT AND TUBING

- 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. Alflex Inc.

- 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
- 3. Anamet Electrical, Inc.; Anaconda Metal Hose.
- 4. Electri-Flex Co.
- 5. Manhattan/CDT/Cole-Flex.
- 6. Maverick Tube Corporation.
- 7. O-Z Gedney; a unit of General Signal.
- 8. Wheatland Tube Company.
- 9. Anaconda
- 10. Triangle
- 11. LTV
- C. Rigid Steel Conduit: ANSI C80.1.
- D. IMC: ANSI C80.6.
- E. EMT: ANSI C80.3.
- F. LFMC: Flexible steel conduit with PVC jacket.
- G. Fittings for Conduit (Including all Types and Flexible and Liquidtight) and EMT: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
  - 1. Fittings for EMT: Compression type.

#### 2.2 BOXES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
  - 2. EGS/Appleton Electric.
  - 3. O-Z/Gedney; a unit of General Signal.
  - 4. RACO; a Hubbell Company.
  - 5. Scott Fetzer Co.; Adalet Division.
  - 6. Spring City Electrical Manufacturing Company.
  - 7. Thomas & Betts Corporation.
  - 8. Steel City
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover. Provided threaded hubs.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1, galvanized steel.
- E. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

## **PART 3 - EXECUTION**

#### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
  - 1. Exposed Conduit: Rigid steel conduit.
  - 2. Concealed Conduit, Aboveground: Rigid steel conduit.
  - 3. Connection to Vibrating Equipment (Including Electric Solenoid or Motor-Driven Equipment): LFMC.
  - 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
  - 5. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- B. Comply with the following indoor applications, unless otherwise indicated:
  - 1. Exposed, less than or equal to 11/4": EMT.
  - 2. Exposed, greater than 11/4": IMC.
  - 3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
    - a. Loading dock.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
  - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  - 5. Connection to Vibrating Equipment (Including Electric Solenoid or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  - 6. Damp or Wet Locations: Rigid steel conduit.
  - 7. Boxes: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 1/2-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
  - 2. Electrical metal Tubing:
    - a. Description: ANSI C80.3; galvanized tubing.
    - b. Fittings and Conduit Bodies: ANSI/NEMA FB 1; insulated throat steel compression type. Set screw or indenter type are unacceptable.

## 3.2 CONDUIT INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

- C. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where otherwise required by NFPA 70.
- D. Do not pull wiring into conduit until conduit systems are complete.
- E. All conduit shall be routed concealed where possible.
- F. Arrange supports to prevent misalignment during wiring installation.
- G. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- H. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- I. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29.
- J. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports
- K. Do not attach conduit to ceiling support wires.
- L. Arrange conduit to maintain headroom and present neat appearance.
- M. Route exposed conduit parallel and perpendicular to walls.
- N. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- O. Maintain adequate clearance between conduit and piping.
- P. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- Q. Cut conduit square using saw or pipecutter; de-burr cut ends.
- R. Bring conduit to shoulder of fittings; fasten securely.
- S. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- T. Install no more than equivalent of four 90-degree bends between boxes. Use hydraulic one-shot bender to fabricate or factory elbows for bends in metal conduit larger than 2 inch size.

- U. Provide sealing fittings on all conduit runs which penetrate exterior walls and refrigerated spaces to prevent circulation of air and/or condensation.
- V. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- W. Provide insulating bushings on all RGS and IMC conduits entering wireways, pullboxes, cabinets, panelboards, etc.
- X. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control and expansion joints.
- Y. Provide Thomas Jet-Line Polyolefin pull cord, minimum 500 lbs., in each empty conduit except sleeves and nipples.
- Z. Use "Push-Pennies" to protect installed conduit against entrance of dirt and moisture.
- AA. Ground and bond conduit under provisions of Section 26 05 33.
- BB. Where connections to free-standing equipment in excess of 18" from structure are required, a vertical, minimum size 3/4", rigid conduit secured to ceiling and floor shall be utilized with wiring into this conduit by means of a rigid connection to a conduit body and wiring from this conduit by means of a conduit body with a flexible conduit connection to equipment.
- CC. Flexible conduit shall not exceed 2'-0" in length unless specified otherwise.

# 3.3 INSTALLATION OF BOXES

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Mounting heights as specified in other sections shall be to the bottom of the outlet.
- C. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. Install boxes to preserve fire resistance rating of partitions and other elements.
- F. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
- G. Use flush mounting outlet boxes in finished areas.
- H. Secure flush mounting box to interior wall. Accurately position to allow for surface finish thickness.

- I. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- J. Use adjustable steel channel fasteners for hung ceiling outlet box.
- K. Do not fasten boxes to ceiling support wires.
- L. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- M. Use gang box where more than one line voltage device is mounted together. Do not use sectional box.
- N. Use separate boxes for low voltage systems. Do not install line voltage and low voltage devices within same outlet.
- O. Use 4 inch square box with plaster ring for single device outlets.
- P. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- Q. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- R. Adjust flush-mounting outlets to make front flush with finished wall material.
- S. Install knockout closure in unused box opening.

# 3.4 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Through-Penetration Firestop Systems."
- B. Install conduit to preserve fire resistance rating of partitions and other elements in accordance with Section 07 84 1. Seal penetrations with Flame-Safe FS900 series firestop compounds as manufactured by International Protective Coatings Corporation (800-334-8796) or equal by 3M or Hilti. Verification of these requirements shall be the responsibility of this Contractor.

# 3.5 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings and finishes are without damage or deterioration at time of Substantial Completion.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage paint finishes with matching touchup coating recommended by manufacturer.

# IDENTIFICATION FOR ELECTRICAL 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.

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Identification for conductors and communication and control cable.
  - 2. Equipment identification labels.
  - 3. Miscellaneous identification products.
  - 4. Panelboard directories.
  - 5. Equipment backboards color coding.

## 1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

# 1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.145.

#### 1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.

- D. Install identifying devices before installing acoustical ceilings and similar concealment.
- E. The room numbers indicated on the Contract Documents were provided by the Architect to assist in identifying spaces during construction. These room numbers may not necessarily be the Owner's final choice of room numbers. The contractor shall obtain from the Owner the final choice of room numbers, and shall use these numbers wherever required. (For example, room numbers are used in programming of fire alarm systems and intercom system, and shall match the Owner's final choice.)

#### PART 2 - PRODUCTS

# 2.1 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. For building wire and cables in sizes 8 AWG and smaller provide with factory insulation to correspond to color code; in sizes 6 AWG and larger provide 3/4" colored tape bands in lieu of colored insulation.

# 2.2 EQUIPMENT IDENTIFICATION LABELS

A. Self-Adhesive, Engraved, Laminated Two Layer Acrylic: Adhesive backed, with black letters on white background

## 2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
  - 1. Minimum Width: (3/16 inch).
  - 2. Tensile Strength: (50 lb), minimum.
  - 3. Temperature Range: (Minus 40 to plus 185 deg F).
  - 4. Color: Black, except where used for color-coding.
- B. Paint: Paint materials and application requirements are specified in Division 9 painting Sections.
- C. Fasteners for Labels: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

# PART 3 - EXECUTION

# 3.1 APPLICATION

A. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape. Identify each ungrounded conductor according to source and circuit number.

- B. Conductors to Be Extended in the Future: Attach to conductors and list source and circuit number.
- C. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.
- D. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
- E. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
  - 1. Labeling Instructions:
    - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with (1/2-inch-) high letters on (1-1/2-inch-) high label; where 2 lines of text are required, use labels (2 inches) high.
    - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
  - 2. Equipment to Be Labeled:
    - a. Access doors and panels for concealed electrical items.
    - b. Disconnect switches.
    - c. Motor starters.
    - d. Contactors.

## 3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

- F. For building wire and cables in sizes 8 AWG and smaller provide with factory insulation to correspond to color code; in sizes 6 AWG and larger provide 3/4" colored tape bands in lieu of colored insulation.
  - 1. Colors for 208/120-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
  - 2. Colors for 480/277-V Circuits:
    - a. Phase A: Brown.
    - b. Phase B: Orange.
    - c. Phase C: Yellow.
  - 3. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of (6 inches) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- H. Painted Identification: Prepare surface and apply paint according to Division 9 painting Sections.
- I. For all panelboards, provide neatly typewritten directory of each device usage including building room numbers (e.g. Convenience Outlets Room A101).
- J. Locate directory inside panelboard door. Protect directory with clear plastic.
- K. Electrical Equipment Backboards: Medium grey.

#### **SECTION 26 24 19**

## **MOTOR-CONTROL**

#### 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 motor-control for use on ac circuits rated 600 V and less.

## 1.3 SUBMITTALS

- A. Product Data: For each type of controller. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Operation and Maintenance Data: For motor-control and components to include operation, and maintenance manuals. In addition to items specified in Division 1 Section "Closeout Procedures Operation and Maintenance Data," include the following:
  - 1. Routine maintenance requirements for motor-control and installed components.
  - 2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

## 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 100 miles of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.
- B. Source Limitations: Obtain motor-control of a single type through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NFPA 70.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide plastic cover to protect units from dirt, water, construction debris, and traffic.

#### 1.6 COORDINATION

- A. Coordinate installation of motor-control with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate features of motor-control and accessory devices with pilot devices and control circuits to which they connect.
- C. Coordinate each motor controller with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

## 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.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Corporation; Cutler-Hammer Products.
  - 2. General Electric Company; GE Industrial Systems.
  - 3. Siemens/Furnas Controls.
  - 4. Square D.

# 2.2 MOTOR-CONTROLLERS

- A. Enclosures: NEMA 250, Type 1(indoor "dry" locations), unless otherwise indicated to comply with environmental conditions at installed location.
  - 1. Outdoor Locations: NEMA 250, Type 3R.

## 2.3 CONTROLLER DISCONNECTING MEANS:

- A. Circuit-Breaker Disconnecting Means: NEMA AB 1, motor-circuit protector with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes. Provide auxiliary contact for disconnection of starter control circuit(s).
- B. Combination Motor Starters: Combine motor starters with motor circuit protector disconnect in common enclosure.

## 2.4 ACROSS-THE-LINE CONTROLLERS

A. Motor Starting Switch: NEMA ICS 2; AC general-purpose Class A manually operated 2-pole, full-voltage controller for fractional horsepower induction motors, without thermal overload unit. Provide in NEMA 1 lockable enclosure.

- B. Magnetic Controller: NEMA ICS 2, Class A, full voltage, non-reversing, across the line, for induction motors rated in horsepower.
  - 1. Control Circuit: 120 V.
  - 2. Overload Relay: NEMA ICS 2; solid-state electronic overload protection.

#### 2.5 ACCESSORIES

- A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.
- B. Selector Switches: NEMA ICS 2; HAND/OFF/AUTO, in front cover of all combination starters.
- C. Auxiliary Contacts: NEMA ICS 2; two normally open field convertible contacts in addition to "latching" contact.
- D. Indicating lights: NEMA ICS 2; LED pilot device with GREEN "motor run" in front cover.
- E. Overload Reset: Externally operable in front cover.
- F. Single-Phase Protective Relay: Provide a single-phase protective relay for all poly-phase magnetic motor starters.

## 2.6 FACTORY FINISHES

A. Finish: Manufacturer's standard grey enamel paint applied to factory-assembled and tested, motor-controllers before shipping.

#### **PART 3 - EXECUTION**

## 3.1 EXAMINATION

- A. Examine areas and surfaces to receive motor-controllers for compliance with requirements, installation tolerances, and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 APPLICATIONS

- A. Select features of each controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, controller, and load; and configuration of pilot device and control circuit affecting controller functions.
- B. Select horsepower rating of controllers to suit motor controlled.
- C. Adjust solid-state overload elements in motor starters to match installed motor characteristics.

## 3.3 IDENTIFICATION

A. Identify motor-controllers and control wiring according to Division 26 Section "Electrical Identification."

## 3.4 CONTROL WIRING INSTALLATION

- A. Install wiring between motor-control devices according to Division 26 Section "Conductors and Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect hand-off-automatic switch and other automatic-control devices where applicable.
  - 1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.
  - 2. Connect selector switches with motor-control circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

## 3.5 CONNECTIONS

- A. Conduit installation requirements are specified in other Division 26 Sections. Drawings indicate general arrangement of conduit, fittings, and specialties.
- B. Ground equipment according to Division 26 Section "Grounding and Bonding."

## 3.6 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
  - 1. Test continuity of each circuit.

# 3.7 ADJUSTING

A. Set field-adjustable overloads and circuit-breaker trip ranges

## **SECTION 26 28 13**

## **FUSES**

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Cartridge fuses rated 600 V and less for use in switches.

## 1.3 SUBMITTALS

- A. Product Data: Include the following for each fuse type indicated:
  - 1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.

## 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NEMA FU 1.
- D. Comply with NFPA 70.

## 1.5 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

## 1.6 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size.

## 1.7 EXTRA MATERIALS

A. Fuses: Furnish three of each size and type to Owner.

## 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. Cooper Bussman, Inc.
  - 2. Eagle Electric Mfg. Co., Inc.; Cooper Industries, Inc.
  - 3. Ferraz Shawmut, Inc.
  - 4. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

## **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 FUSES

- A. Fuses 600 Amperes and Less: ANSI/UL 198E, Class RK5; dual element, current limiting, time delay, 250 or 600 volt fuse as applicable.
- B. Interrupting Rating: 200,000 rms amperes.

## 3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

## 3.4 IDENTIFICATION

A. Install labels indicating fuse replacement information on inside door of each fused switch.

#### **SECTION 26 28 16**

## ENCLOSED SWITCHES AND CIRCUIT BREAKERS

### 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 individually mounted, enclosed switches and circuit breakers:
  - 1. Fusible switches.
  - 2. Nonfusible switches.
  - 3. Molded-case circuit breakers.
  - Enclosures.

## 1.3 DEFINITIONS

A. HD: Heavy duty.

## 1.4 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
  - 1. Enclosure types and details for types other than NEMA 250, Type 1.
  - 2. Current and voltage ratings.
  - 3. Short-circuit current rating.
  - 4. UL listing for series rating of installed devices.
  - 5. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section " Operation and Maintenance Data," include the following:
  - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

## 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.
- C. Product Selection for Restricted Space: Drawings for enclosed switches and circuit breakers are not to scale. Contractor is responsible for maintaining code clearances between enclosures, and adjacent surfaces and other items. Installations shall comply with Article 110 of NFPA 70.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
  - Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
  - 2. Altitude: Not exceeding 6600 feet.

## 1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

#### 1.8 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. Spares: For the following:
    - a. Fuses for Fusible Switches: Three (3)
  - 2. Fuse Puller: Furnish one fuse puller to Owner.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

## 2.2 FUSIBLE AND NONFUSIBLE SWITCHES

- A. Manufacturers:
  - 1. Eaton Corporation; Cutler-Hammer Products.
  - 2. General Electric Co.; Electrical Distribution & Control Division.

- 3. Siemens Energy & Automation, Inc.
- 4. Square D/Group Schneider.
- B. Fusible Switch Assemblies: NEMA KS 1; heavy-duty, quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Cover interlock shall be defeatable. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class R fuses.
- C. Nonfusible Switch Assemblies: NEMA KS 1; Type HD; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Cover interlock shall be defeatable. Handle lockable in OFF position.

#### D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

## 2.3 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

- A. Manufacturers:
  - 1. Eaton Corporation; Cutler-Hammer Products.
  - 2. General Electric Co.; Electrical Distribution & Control Division.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D/Group Schneider.
- B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents. Minimum 25 kAIC.
  - Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
     Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- C. Molded-Case Circuit-Breaker Features and Accessories:
  - 1. Standard frame sizes, trip ratings, and number of poles.
  - 2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.
  - 3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
  - 4. Handle Lock: Include provisions for padlocking.

## 2.4 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
  - 1. Indoor Locations: NEMA 250, Type 1.
  - 2. Outdoor Locations: NEMA 250, Type 3R.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected
- C. Verify that required utilities are available, in proper location, and ready for use.
- D. Beginning of installation means installer accepts conditions.

## 3.2 INSTALLATION

- A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.
- B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated.
- C. Comply with mounting and anchoring requirements specified in Division 26 Section "Electrical Supports."
- D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- E. Install fuses in fusible disconnect switches. Fuses shall be installed in such a way that ratings can be clearly read.

## 3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components.
- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminatedplastic nameplate as specified in Division 26 Section "Electrical Identification."

## 3.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance testing as follows:
  - 1. Inspect mechanical and electrical connections.
  - 2. Verify switch and relay type and labeling verification.
  - 3. Verify rating of installed fuses.
  - 4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.
  - 5. Inspect visually and perform several mechanical ON-OFF operations on each circuit breaker.
  - 6. Verify circuit continuity on each pole in closed position.

## 3.5 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

# 3.6 CLEANING

- A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.
- B. Inspect exposed surfaces and repair damaged finishes.